CONTRACTING METHODS AND MANAGEMENT SYSTEMS OF REMEDIAL ACTION CONTRACTS WITHIN THE U.S. NAVY'S INSTALLATION RESTORATION PROGRAM

by

Darius Banaji

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Signature of Author.....
Department of Civil and Environmental Engineering
July 23, 1993

Certified by.....
Fred Moavenzadeh
Director, Center for Construction Research and Education
Thesis Supervisor

Accepted by.....
Eduardo Kausel
Chairman, Department Committee of Graduate Students

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ABSTRACT

To date, Department of Defense (DoD) officials have identified over 17,660 potentially hazardous waste sites at nearly 2,000 DoD installations. Some DoD experts estimate the total cleanup bill to exceed $24 billion over the next 20 years. To date, the Navy itself is responsible for the cleanup of some 2,500 potential sites at nearly 300 Navy and Marine Corps installations. The Navy estimates their cleanup costs will exceed $3 billion.

To meet the challenges of the next century, the Navy should carefully investigate those areas of its Installation Restoration Program that can be improved. Key components of the program include: Comprehensive Long-term Environmental Action, Navy (CLEAN) contracts already in place for activities from site investigation through remedial design; and a relatively new and evolving component, Remedial Action Contracts (RACs), charged with site remediation.

This thesis analyzes the contract framework and management system for Navy RACs, and assesses the following:

1.) The evolution of the pilot RACs;
2.) The effectiveness of these contracts for timely site remediation;
3.) Recommended improvements required for future RACs.

The two "most" suitable contracting methods for Navy Remedial Action Contracts are, General Contractor or Design-Build Team, both on a reimbursable basis. All eight pilot RACs were written for a general contractor on a cost-plus-fixed-fee basis, with competitive source selection. Contractors are responsible for site remediation by predominant contaminant type at any Navy/Marine Corps installation throughout the U.S. and its territories. The second generation of RACs are also being written for a general contractor through competitive source selection, but on a cost-plus-award-fee basis, with each contract being geographic specific, and requiring that the contractor be generally capable of remediating all contaminant types.

The Navy has selected an appropriate contract organization, type, and award method for environmental restoration contracting. However, to date, only a few sites have been cleaned up. The process has been slower than anticipated. An immediate partial solution would be to modify the pilot RACs and those contracts pending award, to include the concept of partnering.

As the Navy's program matures and additional contracts are written, the Navy should consider the distinct advantages of adopting a design-build contract (on a cost-plus-award-fee basis). In addition, the Navy should consider the combination of a "cost type" contract with unit prices for tasks that can be quantified. This would reduce the financial risk to the Navy, increase control over contractor productivity, and reduce the administrative burdens of a purely "cost type" contract.

Finally, the success of the program will not be determined solely by the choice of an innovative contracting method, but by the individuals tasked to provide technical, contractual, and daily site monitoring. A more aggressive training program should be in place before awarding any future remedial action contracts.

Thesis Supervisor: Dr. Fred Moavenzadeh

Title: Director, Center for Construction Research and Education

St#A, USNPS/Code 031
(Ms. Marsha Schrader - DSN 878-2319)
Telecon, 27 Aug 93 - CB

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Author

Darius Banaji is a lieutenant with the U.S. Navy's Civil Engineer Corps. He received his commission in 1987 from Officer Candidate School at Newport Rhode Island. During his six year career he has served as: Assistant Resident Officer in Charge of Construction in Puerto Rico, and Officer in Charge, Naval Construction Battalion Unit 406, Lemoore, California. He is certified as an Engineer-in-Training by the state of Washington.

Table of Contents

1

Introduction

1.1 General

Armed forces' installations cover 25.6 million acres of America. The past environmental practices of the Department of Defense (DoD) may have resulted in them being considered the single largest polluter of the environment. These past actions were legal, accepted practice, and ethical, based on the knowledge of that time period. Nevertheless, it has resulted with the leakage of oil and other fuels, toxic chemicals entering waterways, the use of unlined landfills, and toxic waste contaminating soil and ground water. To compound the issue, many military bases are adjacent to local water sources; with some neighboring towns having detected higher incidences of tumors, cancer, and birth defects.[1]

As of fiscal year (FY) 1991, officials have identified 17,660 potentially hazardous waste sites at 1,877 DoD installations.[2] Based on these facts, environmental cleanup has become the fastest growing category of military expenditure. There will be an 18% increase in funding from $2.9 billion in 1992 to $3.4 billion in 1993.

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[1] "A Thousand Points of Blight," *Time Magazine*, 09 Nov. 1992, pp. 68-69.

[2] *Defense Environmental Restoration Program, Annual Report to Congress for FY 1991*, U.S. Department of Defense, p. 6.

The task is so overwhelming that accurate cost projections are almost impossible. Some DoD experts put the figure at $24.5 billion over the next 20 years. This figure does not include overseas bases or the nuclear facilities run by the Department of Energy (DoE). The Pentagon's inspector general has said the total cleanup bill might be as high as $120 billion.[3]

The problems and costs have been aggravated by years of neglect. In 1978 the military was instructed to comply with environmental legislation; but the order was not enforced. In 1980 Congress passed the Superfund law, making private polluters responsible for cleaning up hazardous wastes. However, the departments of Defense and Energy were left self regulated.

In September 1992 Congress passed the Federal Facility Compliance Act. The Act clarifies that federal facilities are subject to civil and administrative fines and penalties for violations of federal, state, and local laws dealing with the handling of solid and hazardous wastes. This Act allows the EPA a new and powerful enforcement tool over the DoD's current practices and Installation Restoration Program.

Cleanup efforts have proven to be astronomically expensive. The cost to move 10.5 million gallons of toxic liquids and 500,000 cubic yards of contaminated soil from a single site at the Army's Rocky Mountain Arsenal in Colorado was $32 million. The cleanup cost for the entire base is estimated to be $1.5 billion. The cost to dig out a single landfill the size of a tennis court at Norfolk VA was $18 million. There are an additional

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[3] A Thousand Points of Blight," *Time Magazine*, 09 Nov. 1992, pp. 68-69.

21 such sites. The cost to remove 600 drums of buried toxic waste at Pease Air Force Base in New Hampshire was $22 million.

The staggering costs and overwhelming number of contaminated sites leave the DoD with an incredible challenge. To date, the Navy itself is responsible for some 2,500 potential sites at nearly 300 Navy and Marine Corps installations. The Navy's Installation Restoration Program (IRP), is charged with the investigation and remediation of all contaminated sites.

The Navy's Comprehensive Long-term Environmental Action, Navy (CLEAN) program has been in place since 1989. The CLEAN contracts are responsible for activities from sites investigation to remedial design at Navy hazardous waste sites. To date, the Navy has awarded ten CLEAN contracts worth $1.5 billion.

The final component, Remedial Action Contracts (RACs), are relatively new and still evolving. To date, the Naval Facilities Engineering Command Contracts Office has awarded eight pilot RACs with an aggregate sum of $150 million for site remediation. The Navy is in the process of awarding seven additional RACs with an aggregate sum of approximately $1.7 billion.

It is important that all components of the IRP be implemented in the most effective manner. The area of the program that receives the most public attention may be the RACs, since they deal with the ultimate cleanup of contaminated sites. The Navy RACs are a "cost type" contract awarded through competitive source selection. The thesis will show that the Navy has chosen an appropriate contracting method for RACs. However,

to better meet the challenges of the next century, the Navy may need to look at areas of its remedial action contracts that can be improved upon.

Chapter 2 provides a description of various environmental regulations and statutes, and Department of Defense and national programs for the investigation and remediation of hazardous waste sites. Chapter 3 describes DoD's Installation Restoration Program, including a summary of the number of installations, potential hazardous waste sites, sites listed on the National Priorities List, and the status of sites for each DoD component; with greater detail on Navy/Marine Corps sites. Then the chapter presents the unique attributes of environmental restoration contracting, and the need for developing modified contractual arrangements for such work. Chapter 4 provides an in-depth analysis of the contracting framework of Navy remedial action contracts, including the contract scope, contract organization, contract type, and award method. The analysis also focuses on risk, indemnification, and how the Navy defines the roles and responsibilities of all parties involved. Then, the chapter presents an overview of the performance of all eight pilot RACs, by describing the activities completed under all delivery orders under each pilot RAC as of May 1993. The chapter concludes with a presentation of the advantages and disadvantages of the pilot remedial action contracts. Chapter 5 assesses project drivers, owner (Navy) drivers, and market drivers to determine the "most" suitable contracting framework for Navy remedial action contracts. This is compared to the contract framework chosen by the Navy. This is followed by a discussion of how the Navy's remedial action contracts (pending award) have evolved. The chapter concludes by providing recommendations for the Navy's remedial action contracts based on the

chapter's assessments, other DoD programs, and practices of the private sector. Finally, Chapter 6 provides brief conclusions and recommendations for future research.

The chosen area is controversial, of great public interest, and stems from an issue our society will be challenged with throughout our lifetimes. This thesis takes a focused look at the current strengths of the Navy's remedial action contracts, and makes recommendations for future improvements to an already strong and innovative program.

2

Background

2.1 General

This chapter provides the reader with information on the various environmental regulations and statutes, and Department of Defense programs for the investigation and remediation of hazardous waste sites.

2.2 Comprehensive Environmental Response, Compensation, and Liability Act of 1980

In December of 1980, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authorized federal action in response to cleanup toxic or hazardous contaminants at closed or abandoned waste sites. Also known as the "Superfund Act", it authorized a trust fund to be used by the Environmental Protection Agency (EPA) to cleanup emergency and long-term hazardous waste sites. The Act permits the government to recover costs associated with the cleanup and damages of a site. The costs are recovered from the potential responsible parties (PRPs). Additional cleanup funds are drawn from a "superfund" created by taxes on chemicals and hazardous wastes. Congress created a separate fund, the Defense Environmental Restoration Account (DERA) for DoD sites.

In October 1986, the Superfund Act was amended under the Superfund Amendments and Reauthorization Act (SARA). The amendment extended CERCLA established funds for four years, provided strict schedules for various phases of remedial activities, and established detailed cleanup standards. SARA restated that federal facilities must comply with CERCLA and state environmental laws. In 1990, Congress extended the authorization of CERCLA until September 30, 1994. SARA also codified the Defense Environmental Restoration Program.

The National Contingency Plan (NCP) was written in 1985, and provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.[4] The NCP is also the basic regulation that implements CERCLA, establishing procedures such as a Hazardous Ranking System (HRS) for past waste sites and the National Priorities List (NPL).[5]

2.3 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) was signed in 1976, and amended in 1978, 1980, 1984, and 1986. The Act established a national strategy for hazardous waste management of current and future operations. Whereas, CERCLA covers past disposals and spills.

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[4] 40 CFR 300.1

[5] Section 2.6.1 provides a description of the NPL and HRS score.

2.4 Federal Facilities Compliance Act of 1992

The Federal Facilities Compliance Act (FFCA) of 1992 was signed by former President George Bush in October 1992. The Act clarifies that federal facilities are subject to civil and administrative fines and penalties for violations of federal, state, and local laws dealing with the handling of solid and hazardous wastes.[6] This Act allows the EPA a new and powerful enforcement tool over the DoD's current practices and Installation Restoration Program.

2.5 Defense Environmental Restoration Program

The Defense Environmental Restoration Program (DERP) was established in 1984 to promote and coordinate efforts for the evaluation and cleanup of contamination at DoD installations.[7] There are two programs under DERP: The Installation Restoration Program (IRP), which investigates potentially contaminated DoD installations and formerly used sites for cleanup; and Other Hazardous Waste (OHW) Operations, which encourages research, development, and demonstration so as to improve remediation technologies and reduce DoD waste generation.

DERP is managed centrally by the Office of the Secretary of Defense, with policy direction and oversight by the Deputy Assistant Secretary of Defense (Environment). Each DoD component is responsible for its own program implementation.

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[6] Ralph Lombardo, Esq., "Dealing With Environmental Regulators," *Navy Civil Engineer*, Volume XXXII, Number 1, Winter/Spring 1993, p.28.

[7] DERP Annual Report, p. 1.

2.6 Installation Restoration Program

The Installation Restoration Program (IRP) conforms to the NCP, additionally, EPA guidelines are applied from site investigation through remediation. Each DoD component (Army, Air Force, Navy/Marine Corps) has its own Installation Restoration Program (IRP). The various phases of remedial investigation and activities are similar to those used by the private sector, and are defined below.[8,9]

2.6.1 Pre-Remedial Activities

The first stage is the **Preliminary Assessment (PA)** of an installation to determine if there are any sites present that may be hazardous to public health or the environment. The PA also gathers any available background information, and identifies the magnitude of the potential hazard.

The next step is **Site Inspection (SI)**, which consists of taking samples of media (i.e., soil, surface water, ground water) to determine the extent of contamination, and identify the potential pathways of exposure. The gathered data is used to determine the necessary action required.

A **Hazard Ranking System (HRS)** score is calculated based on data form the PA/SI. The scored is based on factors such as: the amount and toxicity of contaminants present, their potential mobility in the environment, the availability of pathways for human exposure, and the proximity of population centers to the site.[10] A score of 28.5 or greater

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[8] DERP Annual Report, summarized from p. 2.

[9] Camp, Dresser & Mckee, *MIT Course 1.972, Environmental Restoration Engineering,* (Lecture 2.0), Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, Spring 1993.

places a site on the **National Priorities List (NPL)**. The ranking of the NPL is updated annually.

2.6.2 Evaluation of Remedial Alternatives

Contaminated sites are studied fully in the **Remedial Investigation/Feasibility Study (RI/FS)** stage. The RI may include further investigation of a site to determine the nature, extent, and significance of contamination. The evaluation also focuses on determining the risk to public health. The FS is conducted concurrently, and evaluates the remedial alternatives for the site, and the applicable or relevant and appropriate requirements (ARARs)[11]. The evaluation of remedial alternatives is based on the nine criteria by the EPA, namely:[12]

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability;

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[10] DERP Annual Report, summarized from p. 2.

[11] Applicable or relevant and appropriate requirements for a particular site. *Applicable* requirements are those cleanup standards, and other substantive environmental protection requirements under Federal or state law that specifically address a hazardous substance remedial action at a CERCLA site. *Relevant and appropriate* requirements are those cleanup standards, and other substantive environmental protection requirements under Federal or state law that are not applicable to a CERCLA site but are similar to those encountered at the CERCLA site, and thus their use is well suited at the site.

[12] 40 CFR 300.430

- Cost;

- State acceptance;

- Community acceptance.

The **Record of Decision (ROD)** is a legal document of the proposed cleanup plan for a site. It shows the decision making process so as to support the technical and legal decisions made for a site. The ROD needs to be court defendable. If a site is NPL listed, the EPA must concur with the ROD. If the site in question is a non-NPL site the remediation alternatives need only state approval.

2.6.3 Implementation of Remedial Action

Upon agreement of the remediation alternatives the **Remedial Design (RD)** is prepared for a site. The RD is a detailed design for the cleanup of the site, and is based on RI/FS data and the ROD.

The actual cleanup of a site is labeled **Remedial Action (RA)**. The work is performed by specialized contractors, and may include activities such as:

- Removal/disposal of contaminated media,

- Alternative water supply/treatment,

- Incineration,

- Remediation by pumping and treating contaminated ground water.

The ultimate goal is site closeout or deletion from the NPL. This is achieved if site remediation is complete. A site can also be closed out during any phase if data deems that no further response action is planned (NFRAP) or required. The DoD also considers a

site "complete" if long-term remediation, such as a "pump and treat" system is in place and operational.

An exception to the above sequence are **Interim Removal Actions (IRAs)**. These actions are conducted at any time during the program to protect human health and the environment. Such measures may include removing concentrated sources of contaminants, providing an alternate water supply, or constructing structures such as slurry walls to prevent the spread of contamination.

2.6.4 Installation Restoration Program Priorities

The order in which DoD conducts IRP project activities is based on a policy assigning the highest priorities to sites that represent the greatest potential public health and environmental hazards.[13] DoD developed the Defense Priority Model (DPM). The model goes one step further than the HRS, by using RI data in addition to PA/SI data to assess the relative risk presented by a site. The model considers the following site characteristics:[14]

- Hazard -- the characteristics, concentrations, and mobility of contaminants;
- Pathway -- the potential for contaminant transport via surface water, ground water and air/soil;
- Receptor -- the presence of potential human and ecological receptors.

In the DoD's opinion, this risk-based approach recognizes the importance of protecting public health and the environment, and objectively prioritizes sites for funding. In a

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[13] DERP Annual Report, p. 3.
[14] *Ibid.*

constrained funding environment, the DPM may provide an adequate method to determine which sites will receive funding first.

2.7 Comprehensive Long-term Environmental Action, Navy Program

The Navy's Comprehensive Long-term Environmental Action, Navy (CLEAN) program is administered by contracts that are cost-plus-award-fee (with ceilings), indefinite-quantity, indefinite-delivery type, and are awarded through competitive source selection.[15] The contract term is based on one base year with nine option years. Such lengthy contracts may allow contracts to extend through the entire IRP period. These contracts are geographic specific to the Engineering Field Division[16] that awards the contract.

The services under these contracts may include all activities from PA through RD as required. Specifically, the services may include, but are not limited to:[17]

- Environmental related assessments, investigations, and studies;
- Preparing remedial designs;
- Preparing environmental permit applications;
- Preparing environmental planning documentation;
- Conducting environmental compliance evaluations;
- Performing interim removal actions;

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[15] Chapter 4 provides a description of such a contract framework.

[16] Engineering Field Division (EFD) is one of the Naval Facilities Engineering Command (NAVFACENGCOM) regional contracting organizations. NAVFACENGCOM, abbreviated as NAVFAC, is the Navy organization with primary responsibility for facility planning, acquisition, and management for the Navy and Marine Corps.

[17] *CLEAN Contract Manual NAVFAC P-1070,* Naval Facilities Engineering Command, Alexandria Virginia, July 1992, p. 5.

- Performing emergency spill response and cleanup;

- Preparing reports, correspondence, and other documents of findings, conclusions, and recommendations resulting from studies and investigations.

The federal environmental statutes affecting CLEAN contracts are CERCLA/SARA and the Solid Waste Disposal Act. In summary, the scope of CLEAN contracts may include any or all subjects covered by pertinent environmental statutes and regulations.

Remedial Action Contracts (RACs) are the Navy's contracts that are in place for the specific purpose of site remediation. A majority of the thesis will describe the framework of Navy RACs, their performance to date, and recommendations for future application.

2.8 Chapter Summary

This chapter has provided the reader with the key environmental statutes and regulations, and DoD programs to meet the challenges of investigating and cleaning contaminated sites at installations throughout the United States and its territories. A basic understanding of the pertinent statutes and programs is an important step in understanding the unique nature of environmental restoration contracting.

3

Defense Installation Restoration Program

3.1 General

As of fiscal year (FY) 1991 the DoD Installation Restoration Program (IRP) had identified 17,660 sites at 1,877 installation throughout the Unites States and its territories.[18] The cost to investigate and remediate these sites, as well as operation and maintenance of remedial systems through the next 20 years is estimated at $24.5 billion. This estimate does not include contingencies for changes in regulations.

The DoD has a large need for environmental restoration contracting over the next decades. This chapter will briefly familiarize the reader with the DoD and Navy IRP, including a discussion on the total number of sites, their status, sites listed on the National Priorities List (NPL), technologies implemented, and funding. The unique characteristics of environmental restoration contracting and the drivers for developing modified contractual arrangements will then be described.

3.2 DoD Installation Restoration Program

The DoD has continued to have substantial growth in the number of installations and sites included in the IRP over the past years. These figures have stabilized as of FY 1991. Figures 3.1 and 3.2 show the growth over the past six years.

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[18] *Defense Environmental Restoration Program, Annual Report to Congress for FY 1991.* Data for this chapter is extracted and summarized from the Report. A more current Report was not available for public release when this thesis was written.

Figure 3.1 Number of Installations by FY[19]

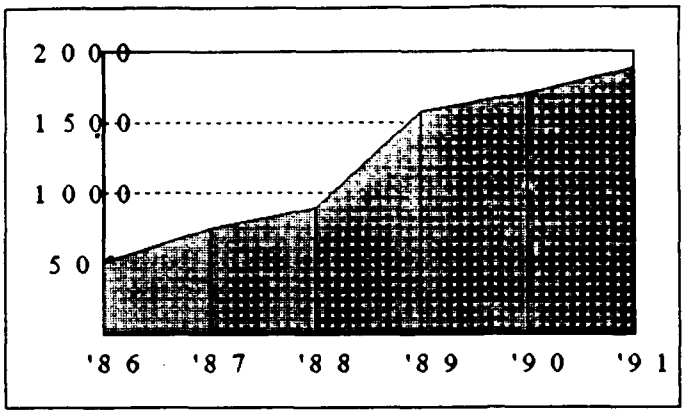

Figure 3.2 Number of Sites by FY[20]

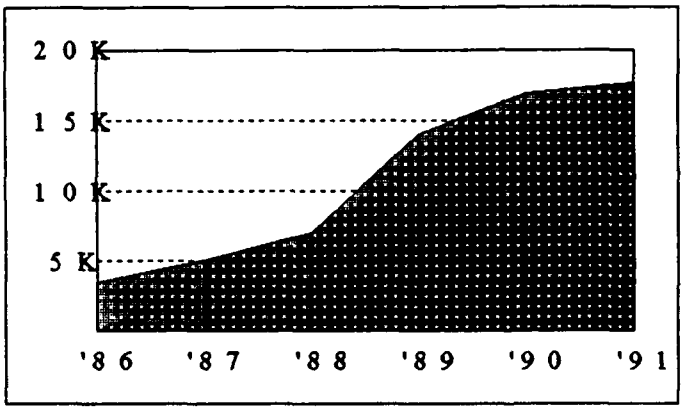

Table 3.1 lists the number of contaminated sites and installations by each DoD component. The Army has 60% of the sites, the Air Force with 25%, the Navy and Marine Corps with 13%, and the Defense Logistics Agency (DLA) with 2%. The Army also has the largest number of installations with restoration needs, with the Navy and Air Force having a much lower and comparable number of installations.

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19 *Ibid.*, p. 4.

20 *Ibid.*

Table 3.1 Installation Restoration Program: Summary of Installations and Sites[21]

	ARMY	NAVY[1]	AIR FORCE	DLA	TOTAL
Number of Installations	1,265	247	331	34	1,877
Number of sites	10,578	2,409	4,354	319	17,660
Number of Active Sites	5,524	1,688	3,520	192	10,924
Closed-out Sites[2]	5,054	721	834	127	6,736

[1] Includes Marine Corps
[2] Sites requiring no further action

By the end of FY 1991, 6,336 projects were actively underway at sites throughout the nation. Activities included preliminary assessments (PA), site investigations (SI), remedial investigation/feasibility studies (RI/FS), remedial design (RD), remedial action (RA) and interim remedial action (IRA). The DoD has focused on the worst sites first, by concentrating efforts on the 91 installations with sites listed on the NPL. From the 372 remedial activities to date, 207 have been on NPL sites. These activities have included complete site remediation, interim remedial action, and long-term remediation such as "pump and treat" operations.

The final goal of any site is "closeout." Such a site is categorized as one where no further response action is planned (NFRAP). NFRAP is a CERCLA term, the primary criteria for NFRAP is a determination that the site does not pose a significant threat to

[21] *Ibid.*, p. 6.

public health or the environment.[22] A NFRAP decision can be made at any phase of the remedial process, but must be documented, and can be reversed if future information reveals that additional remediation is required. The majority of the site close-out actions have been for non-NPL sites. As listed in Table 3.1, the DoD has closed out 6,736 sites.

PAs have been completed at 17,386 of the 17,660 identified sites. SIs have been completed at 10,050 of the 12,319 sites not considered NFRAP from the PAs. RI/FS efforts have been completed at 1,493 of the 6,383 sites requiring further studies. Additionally, 4,012 sites require remedial action, of these, 372 are complete and 698 were underway at the end of FY 1991. Table 3.2 presents the status of all DoD sites by program phase as of FY 1991.

Table 3.2 DoD IRP Status by Program Phase[23]

	PA	SI	RI/FS	RD	RA
COMPLETED ACTIVITY	17,286	10,050	1,493	392	372
ACTIVITIES UNDERWAY	350	1,141	3,402	745	698
FUTURE ACTIVITIES	24	1,128	1,488	2,877	2,942
CLOSED OUT SITES	5,038	1,378	247	0	73

3.2.1 Navy Installation Restoration Program

At the end of FY 1991, the Navy identified 721 IRP sites for closeout. PAs had been completed at 2,362 of the 2,409 identified IRP sites. SIs had been completed at

[22] *Ibid.*, p. 7.
[23] *Ibid.*

1,580 sites, with activities underway at 477 sites, and with 68 sites still requiring future action. Five hundred and six Navy sites were closed out during the SI phase. RI/FS efforts had only been completed at 38 sites, with activities underway at 971 sites, and with 529 sites requiring future action. Ten Navy sites were closed out during the RI/FS phase.

The slowest phases appear to be RD and RA. As of FY 1991, the Navy had completed RDs at only 9 sites, with RDs underway at 27 sites, and with 1,286 sites requiring future RD. RA was completed at 60 sites, with RAs underway at 38 sites, and with 1,330 sites requiring future RA. A larger number of sites have been completed or are underway in each phase, due to the Navy's efforts in FY 1992. However, no current data could be obtained, since the DERP Annual Report for FY 1992 is not yet available. Table 3.3 depicts the status of Navy/Marine Corps IRP sites by program phase as of FY 1991.

Table 3.3 Navy/Marine Corps IRP status by Program Phase[24]

	PA	SI	RI/FS	RD	RA
COMPLETED ACTIVITY	2,362	1,580	38	9	60
ACTIVITIES UNDERWAY	43	477	971	27	38
FUTURE ACTIVITIES	4	68	529	1,286	1,330
CLOSED OUT SITES	200	506	10	0	5

[24] *Ibid.*

3.2.2 Remedial Activities at DoD Sites

There have been various types of remedial action in progress at the DoD sites. As a FY 1991, 253 remedial activities were initiated at 163 installations. The types of activities have included:

- Alternate water supply/treatment,
- Incineration,
- Site treatment/remediation,
- Decontamination,
- Waste removal,
- Ground water treatment.

In FY 1991 DoD spent nearly $5 million in Research, Development & Demonstration (RD&D). This is a small percentage of total DERA funds. DoD components should be encouraged to invest more funds in RD&D. The initial efforts may require large financial commitments upfront, but the future cost savings may be enormous. The goal should be to find more cost efficient and timely remediation processes.

The Navy is currently in the RD&D phase of a new technology to incinerate PCBs at a site. This technology was introduced by the remedial action contractor, and is projected to be as effective as other proven methods, and at substantial cost savings. Although a potential cost savings measure for the future, it may be of little retroactive help, since past Records of Decision (ROD) would require modification and resubmission. Since this would delay site remediation, it is unlikely that this new technology will be used at this site. However, it should prove useful for future remedial activities.

3.2.3 DoD NPL Installations

The EPA Hazardous Ranking System (HRS) evaluates sites based on the potential hazard posed to public health and the environment. The HRS score is based on the results of PA/SI data. A site is placed on the NPL if the HRS is 28.5 or higher. As of FY 1991, the DoD had 91 active installations and 10 formerly used defense sites proposed for or listed on the NPL. Although, since two areas at seven of the 91 active installations are listed twice on the NPL, the total number of active NPL listings is 98. All NPL listings by DoD component as of FY 1991 are shown in Table 3.4.

Table 3.4 DoD Installations Listed on the NPL[25]

DoD COMPONENT	ACTIVE INSTALLATIONS	FORMERLY USED DEFENSE SITES	FUNDING AS OF FY 1991 ($ MILLION)
ARMY	36	3	867.9
NAVY	26	2	209.3
AIR FORCE	32	2[1]	721.9
DLA	4	0	37.6
DEPT. OF WAR[2]	0	3	2.7
TOTAL	**98**	**10**	**1839.4**

[1] These are Army and Air Force sites.
[2] The DoD was formerly called the Department of War.

DoD has completed PA and RI/FS activities at all of the active NPL installations. As of FY 1991, IRAs or RAs were underway at 86 installations. Furthermore, RODs for

[25] DERP Annual Report, summarized from pp. B-1 - B-100.

at least one operable unit at eight NPL installations was completed as of FY 1991. This brought the total DoD NPL installations with signed RODs to 12. It should be noted that each ROD generally covers only a portion of an installation.

DoD sites are moving slowly from investigation to cleanup. As a result, DoD, EPA, and DoE have formed Interagency "Experts Groups" to explore and tackle the bottlenecks in the cleanup process. One area of focus is innovation in the cleanup process. Current approaches discourage new and unproven technologies. This may reduce the risk of failure, but stifle the development of more timely and cost-effective techniques.

An underlying difficulty associated with many system bottlenecks results from approaches that emphasize the restoration **process** rather than the final objectives.[26] Time will determine if such problems can be overcome, thus allowing timely site remediation.

3.2.4 Navy NPL Sites

As of FY 1991, the Navy had sites from 26 active installations on the NPL. Table 3.5 provides a brief description of these NPL installations.

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[26] *Ibid.*, p.9.

Table 3.5 Navy NPL Listings[27]

STATE (# OF NPL LISTED INSTALLATIONS)	HRS SCORE	FUNDING AS OF FY 1991 ($ MILLION)
Arizona (1)	32.24	1.6
California (5)	24.49-48.77	88.72
Connecticut (1)	36.53	2.7
Florida (3)	31.99-42.40	16.9
Georgia (1)	44.65	2.5
Hawaii (1)	70.82	10.7
Maine (1)	43.38	3.8
Minnesota (1)	30.83	6.1
New Jersey (2)	37.21-50.53	12.2
North Carolina (1)	33.13	5.9
Pennsylvania (1)	57.93	0.94
Puerto Rico (1)	34.28	1.2
Rhode Island (2)	32.25-34.52	4.4
Washington (5)	30.42-55.91	38.5
TOTAL FUNDING	----	196.2

[27] DERP Annual Report, summarized from pp. B-4 - B-100.

The type of contaminants at these sites can be generalized into the following categories:

- Polychlorinated biphenyls (PCBs),
- Petroleum, oils, and lubricants (POLs),
- Combined waste (landfills),
- Ordnance,
- Acids, Metals & Bases,
- Pesticides,
- Paints and Solvents.

The extent of contamination at these sites potentially range from:

- Surface and subsurface soil,
- Surface water,
- Drinking and ground water,
- Aquifers,
- Shoreline sediments,
- Nearby wetlands,
- Nearby waterways.

3.3 Drivers for Developing Modified Contractual Arrangements

Removal and cleanup of the above contaminants from various media includes construction related tasks such as, soil removal and replacement, piping and pumping systems, and monitoring wells. However, the inherent nature of environmental cleanup

has associated financial risks, and uncertainties of changing site conditions that are not normally encountered in "traditional" construction.

The market for environmental restoration has some very distinct differences from "traditional" construction that influence the need for modified contractual arrangements.

3.3.1 Likelihood of Changes and Uncertainty

Environmental restoration contracting has a greater likelihood of changes and uncertainty than "traditional" construction contracting. Projects deal with the remediation of a complex array of contaminants in varied media. Typically, the nature and extent of contamination is determined by sampling of surface and subsurface soil and water. The subsurface investigations are conducted by monitoring wells. Some questions that may arise include:

- How many wells are required for a representative analysis of the site?
- How representative is a 2-inch diameter well for a given area?
- How much sampling is enough?
- For what period of time can the collected data be considered "accurate?"
- Are there isolated "hot spots" that were missed during the investigation?
- What is the potential source of contaminants?

The extent of contamination may vary greatly depending on soil properties such as transmissivity and ground water elevations. The nature and extent of contamination at a site is continually changing.

Section 120(e)(1) of SARA requires that RI/FS work be initiated at a site within six months of listing on the NPL. Section 120(e)(2) of SARA specifies that on-site remedial action be initiated within 15 months of completion of the RI/FS and issuance of a ROD for an NPL listed site. Based on the length of the RI/FS, it may take several years to progress from studies to actual site cleanup. The passage of time may be a large factor in increasing the uncertainty of site conditions. Unlike "traditional" construction, key design parameters are continually changing during the design process on typical hazardous waste sites.

3.3.2 A "One-Of" Service

Each site has unique RD and RA depending on the nature and extent of contaminants. Due to the unique requirements, environmental restoration of a site is more of a "one-of" service than the construction of a building. A firm that provides RD/RA needs to have knowledge and expertise in skills such as environmental policies and regulations, chemical engineering, and hydrogeology just to name a few. The skills and experience of a potential contractor should be key in the selection/award process. Hence, alternative contractual arrangements should be investigated for environmental restoration, so as to better allocate the financial risk from the contractor to the owner, and to select a contractor based more so on technical merit than cost.

3.4 Chapter Summary

DoD represents a large market for environmental restoration contractors. As a FY 1991, the DoD Installation Restoration Program identified over 17,600 sites at over 1800 installations. The cost to complete site restoration over the next 20 years is estimated at $24.5 billion. As of FY 1991, DoD has funded approximately $1.8 billion for activities ranging from site assessment to some interim and long-term remedial action.

The slowest phase is from the study phase (RI/FS) to site remediation (RD/RA). This may be attributed to many factors including; site complexity, regulations, changing site conditions, concerns of liability for the remediation technique chosen, and the inherent manner in which the system discourages the use of innovative technologies.

The ability of the Installation Restoration Program to encourage the use of innovative technologies, risk sharing with the contractor, and alternative contracting methods may lead to less costly and more timely site remediation.

The following chapter will discuss in depth how the Navy's remedial action contracts are structured so as to better manage the risks and uncertainties associated with environmental restoration contracting.

4

Pilot Remedial Action Contracts

4.1 General

As of fiscal year 1992 the Navy has identified requirements for over 1,600 future remedial actions at nearly 300 Navy/Marine Corps installations. Current estimates of the cost to remediate these sites is in excess of $3 billion.

Between August 1991 and July 1992, the Naval Facilities Engineering Command Contracts Office (NAVFACCO) awarded eight pilot Remedial Action Contracts (RACs). The estimated total value of these contracts is $150 million. These contracts are cost-plus-fixed-fee (with ceilings), indefinite-quantity, indefinite-delivery type, and were awarded through competitive source selection. The period of performance is five years. Work is accomplished by individual delivery orders, which are placed by the Navy against each contract, up to the ceiling amount of the entire contract.

The Navy originally planned on each Engineering Field Division (EFD) awarding and administering remediation contracts as a follow-on to the Navy's CLEAN contracts. The RACs were to be used primarily for preparing technology transfer packages and performing research and development. However, due to the administrative burden placed on the EFD's by CLEAN contracts, the Naval Facilities Engineering Command (NAVFAC) decided not to assign the EFDs with the additional administrative burdens of administrating the initial RACs. This decision, coupled with Department of Defense and

public pressure to remediate sites, has resulted in the pilot RACs being used primarily for remedial action than for technology transfer.[28] Table 4.1 presents basic contract data for the eight pilot RACs.

Table 4.1 Pilot Remedial Action Contracts[29]

CONTAMINANT TYPE	AWARD DATE	CEILING AMOUNT $	MINIMUM OBLIGATION $
PCB	07/28/91	15,000,000	75,000
POLs Clean	12/16/91	20,000,000	100,000
POLs Mixed	12/27/91	40,000,000	200,000
Pesticides	01/10/92	10,000,000	50,000
Acids, Metals & Bases	01/17/92	25,000,000	125,000
Paints & Solvents	03/23/92	10,000,000	50,000
Ordnance	06/12/92	15,000,000	75,000
Combined Wastes	07/02/92	15,000,000	75,000

Previous chapters focused upon environmental policies and regulations, the market size, and the unique attributes of environmental cleanup contracts. This chapter will focus upon all aspects of the contracting framework of RACs, including risk, indemnification, and how the Navy defines the roles and responsibilities of all the parties involved. Then,

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[28] Kathy Volpe, Contracting Officer, Naval Facilities Engineering Command Contracts Office, Port Hueneme, California. Summarized from interviews and a site visit of May 17, 1993.

[29] Amy Jones, Contracts Division, Naval Facilities Engineering Command Headquarters, Alexandria Virginia. Summarized from interviews and a site visit of March 25, 1993.

based on an understanding of the above, an overview of the performance of the eight pilot RACs is presented.

4.2 The Framework of Remedial Action Contracts

As used in this thesis -- the framework of a contract includes a specific description of its scope, organization, type, and award method.[30]

4.2.1 Contract Scope

A construction project can conveniently be broken into three basic components -- project design, construction, and project financing. The term "contract scope," as used in this thesis, is the completion of a specified portion of the above tasks by the "construction team." In the "traditional" construction method, the contractor only performs construction, with the design performed by a different party, and the owner arranging the financing. In "design-build," the contractor performs both the design and construction, with the owner arranging the financing. In other variations, such as build-operate-transfer, the contractor performs all three components of the project.

The scope of RACs are similar to the traditional method, in that the contractor primarily provides construction type services. The Navy's Remedial Action Contracts are

[30] It is assumed the reader has some knowledge of the above terms and their application. These terms will be described in sufficient detail to support their application in this thesis. A complete study of all the variations of the above is beyond the scope of this thesis. For a thorough study the reader is referred to Christopher M. Gordon, P.E., *Compatibility of Construction Contracting Methods with Projects and Owners*. Thesis submitted to the Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, September 1991.

structured such that one contractor cannot perform both remedial design and remedial action for a site. As described previously, Comprehensive Long-term Environmental Action, Navy (CLEAN) contracts may be used to perform a variety of design services -- from site investigations (SI) through the Records of Decision (ROD) and Remedial Design (RD). The CLEAN solicitation includes a clause which prevents the CLEAN contractor (and those affiliates who provide initial technical and design support) from also performing any remedial action at a later date. The Federal Acquisition Regulation (FAR) 9.507 describes the minimum solicitation provisions and contract clause requirements which must be addressed. Federal Acquisition Regulation 9.502 and 9.504 further define conflicts to be avoided and specific contracting officer responsibilities.

A principal objective of Navy's RACs is to select contractors to perform remedial actions at hazardous waste sites once the investigations and recommendations have been completed. These sites are at Department of Navy and Marine Corps installations, located throughout the United States and its territories, and consist of a mixture of sites that are listed on the Superfund National Priority List (NPL) as well as sites that are not listed on the NPL.

All eight contracts that have been awarded by the Navy to date are quite similar to one another, except that each is written to cleanup a specific contaminant. Contractors are assigned work at a specific site based on a match between the predominant contaminant at the site and the contaminant to be remediated by that contractor. Only one contractor performs all remedial activities at a site, including contaminants that may be

present at lower levels than the predominant contaminant. The eight contracts by contaminant type are:

- Polychlorinated Biphenyls (PCBs),
- Petroleum, Oil and Lubricants (POLs) (mixed),
- Petroleum, Oil and Lubricants (POLs) (clean),
- Combined Waste (landfills),
- Ordnance,
- Acids, Metals & Bases,
- Pesticides,
- Paints and Solvents.

The services at these sites may include:[31]

- Demonstrating technologies,
- Preparing technology transfer packages,
- Providing training on a technology,
- Performing pilot studies,
- Performing removal actions at combined waste sites,
- Performing expedited response actions,
- Performing remedial actions at combined waste sites,
- Performing other related activities associated with returning hazardous waste sites to safe and acceptable levels.

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[31] Section C, Part 1.2.1 of typical Navy pilot Remedial Action Contracts.

The above demonstrates that these RACs were initially written as service type contracts, for the primary purpose of technology transfer, rather than construction type contracts for remedial action.

The work under each of the eight RACs is performed pursuant to individual delivery order work statements. Each delivery order is for a single site and all contaminants present at the site. These RACs have an ordering period of up to five years to reach the monetary ceilings of each contract. The Navy felt if they had chosen a longer term for the contracts, it may have led to a group of contractors having full program control. Choosing a term of less than five years may not have allowed an adequate time frame to accomplish remediation at Navy and Marine Corps sites.

As described above, delivery orders under the contracts are either of a service or construction type. The orders that are categorized as service type include: demonstrating technologies, preparing technology transfer packages, providing training, and performing pilot studies. The orders that are categorized as construction type entail removal or remedial action at combined waste sites.[32]

These delivery orders include various documents to further describe technologies selected for the cleanup, or to further describe the hazardous waste site(s). The delivery orders may include documents such as: the record of decision, remedial investigation/feasibility study reports, and plans and specifications prepared by the Navy or CLEAN contractor. The plans and specifications vary in their detail and definition, depending on the number of previous studies and complexity of the site.

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[32] These services are differentiated, and must be reflected in the award method (Section 4.2.4).

As with the original contract, delivery orders are also cost-plus-fixed-fee. The scope of work indicates that individual delivery orders may vary from remedial action work, operation/maintenance services, to related engineering services.

4.2.2 Contract Organization

The contract organization is the entity with whom the Navy holds a construction contract. Organizations can include entities such as a general contractor, construction manager, multiple primes, design-build team, turnkey team, or build-operate-transfer team.

Remedial Action Contracts are issued in a manner typically used by general contractors. The remedial contractor is responsible for monitoring safety, quality control, and subcontractors. These contracts are highly complex in nature, and require contractors to have highly specialized and technical skills.[33] The contract work requires companies with experience in environmental cleanup, and an understanding of the broad range of associated technical and regulatory requirements. Therefore, evaluation of technical factors in addition to cost, is essential in determining the capabilities of the proposing firms.[34]

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[33] The required skills and responsibilities of Naval personnel is presented in Section 4.5.

[34] The source selection process will be described under Section 4.2.4 Award Method.

4.2.3 Contract Type

The contract type used in the RACs are time and materials contracts -- based on the cost of the work plus a fixed fee. This is very different from "traditional" lump-sum contracts used on most public projects.

4.2.3.1 Lump-sum Contracts

In lump-sum contracts the contractor bears most of the risk, and the owner takes little risk. The contractor estimates a total cost including a margin of profit, and bids a fixed price. If the actual cost is higher than the estimate, the contractor absorbs the additional cost. The price to the owner remains the same. An increase in price would only arise from some form of a change to the original contract. If the actual costs are less than the estimate, the extra margin goes to the contractor. As a result these contracts are truly zero-sum games. Therefore, such contracts are more suited for projects that are not complex; with complete plans and specifications, a well defined scope, with well known site conditions, and where minimal changes to work are envisioned. The advantages of lump-sum contracts include:[35]

1. Competitive bidding can be used, resulting in a low price.

2. The owner does not have to monitor and approve each expenditure.

3. The total cost is known at the start of construction, and the risk of completing the work for that cost rests with the contractor.

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[35] Christopher M. Gordon, P.E., *Compatibility of Construction Contracting Methods with Projects and Owners.* Thesis submitted to the Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge Massachusetts, September 1991, pp. 117-118.

The disadvantages of lump-sum contracts include:[36]

1. The contractor may include a large contingency to cover the risk of completing the job for the agreed-to sum.

2. Changes, after the contract has been signed, are often expensive and difficult for the owner. This is especially a problem if the documents are insufficient, and claims result.

3. The contractor may default on the contract if a major error was made in the bid, causing delays and expense for the owner.

4. The documents must be complete before the price is agreed to, eliminating both a fastrack schedule and pre-construction advice from the contractor.

5. Adversarial relationship may result due to the zero-sum game nature.

4.2.3.2 Cost-plus Contracts

Time and material or cost-plus contracts are those in which the contractor is reimbursed for all expenses including material, labor, project overhead, plus a fee that includes company overhead and profit. For cost-plus contracts, reputation, ability, and trust are paramount.[37] This type of contract, if not properly structured can shift the risk of productivity from the contractor to the owner. A combination of cost-plus and unit prices is a good way to protect the owner. Additionally, the owner needs a sophisticated and strong project management team -- one that can monitor the contract, the work

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[36] *Ibid.*, p. 118.

[37] John D. Macomber, "You Can Manage Construction Risks," *Harvard Business Review*, March-April 1989, p. 163.

performed, and audit the costs submitted by the contractor. The advantages of cost-plus contracts include:[38]

1. A fastrack schedule can be used.
2. Pre-construction advice from the contractor is available.
3. Changes by the owner are easily accommodated.
4. Teamwork can replace the adversarial relationship often found in a lump-sum contract.
5. If properly managed by a sophisticated owner, cost can be reduced by the elimination of contingencies, claims, and bidding process.

The disadvantages of cost-plus contracts include:[39]

1. The total cost is not known before the start of construction, which can cause financing and other problems.
2. The owner must be sophisticated and heavily involved to minimize overcharging, unnecessary delays, and uncompetitive purchasing.
3. Competition may be reduced by the elimination of lump-sum bidding; this can be mitigated by bidding subcontracts.

4.2.3.3 Pilot Remedial Action Contracts

The eight pilot Remedial Action Contracts are cost-plus-fixed-fee, indefinite-quantity, indefinite-delivery type contracts. Each contract has a minimum funding obligation and maximum ceiling amount.

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[38] Gordon, P.E., pp. 122-123.
[39] *Ibid.*, p. 123.

Several contract types were considered. Lump-sum, firm-fixed-price contracts were rejected since they were found inappropriate for hazardous waste cleanup due to the uncertainties with the scope of work involved. These uncertainties include characterizing the subsurface media, quantities, and nature and extent of subsurface contaminants. If firm-fixed-price contracts were used, the contracts would either be modified extensively due to the unforeseen nature of the work; or if all the risk was put on the contractor, the contractor's price would include large contingencies for uncertainties. Neither of these situations were deemed desirable. In the first case, the contractor in reality would work on a near cost-plus contract due to unforeseen site conditions, with the Navy in a poor negotiation position. In the second, the Navy pays for contingencies that may never occur.

In the Navy's opinion, a cost-plus-award-fee contract would have been difficult to administer. In such contracts, a total award fee "pool" is negotiated, and consists of a base amount and award amount (FAR 16.404-2). The total fee cannot exceed 10% of the contract sum. The base fee is the minimum fee the contractor can earn on the contract, and it cannot exceed 3% of the contract sum. The percentage of the award fee received by the contractor is based on the performance during the specific period. The objective of the award fee is to afford the contractor an opportunity to earn fees commensurate with optimum performance.

For cost-plus-award-fee contracts to be effective, there needs to be a fair and consistent award fee process. This may not be possible with the pilot RACs, since the contracts are defined by contaminant type and are administered throughout the United

States and its territories by a large number of Engineering Field Divisions. Award fees would be difficult to fairly apply because of the variety of work and services to be performed, as well as the different evaluation procedures at the variety of Engineering Field Divisions providing on-site technical representatives.

After considering other approaches, cost-plus-fixed-fee contracts were selected for the eight Remedial Action Contracts awarded by NAVFACCO. Fees determined for individual delivery orders are fixed and cannot vary according to actual costs incurred during performance. Fees are not adjusted for cost overruns or when an order has been completed at less than the total estimated cost. Fee adjustments are made for modifications which cause an increase or decrease to the scope of the delivery order.

These contracts provide the flexibility required for environmental cleanup, and provide the contractor incentive to control costs. Cost-plus type contracts shift some risks from the contractor to the Navy.[40] Additionally, these contracts are easier to administer compared to cost-plus-award-fee contracts.

The maximum amount of fixed fee available to be earned under a contract is determined based on rates proposed by the contractor on "typical projects" in response to the solicitation. The fee is earned and paid as a result of work performed on individual delivery orders.

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[40] This will be further discussed in Section 4.3 Risk.

The fee is calculated at the rates and in the manner proposed by the contractor in their best and final offer.[41]

The fixed fee for the contracts is determined as follow:

X% x burdened labor costs,

Y% x material and equipment costs,

Z% x subcontract costs.

The contractor's allowable costs, such as overheads are covered in the billings exclusive of fee. As a result, the fee is primarily profit for the contractor. For cost reimbursable subcontracts, no fee is allowed to the contractor against subcontractors' fees. The prohibition of "fee on fee" for cost reimbursable subcontracts applies to all tiers of subcontracting.

The total fixed fee for individual delivery orders are paid in installments as a proportion of costs expended and billed monthly. If, after the completion of work on a delivery order, the actual costs incurred is less than the total cost estimated for that order, a final voucher for the fee balance is submitted by the contractor. However, if the actual costs incurred are more than the total cost estimated for that order, the fee is paid on monthly vouchers only to the extent established as the total fixed fee for that order.

The total fee on the entire contract cannot exceed the statutory ten percent limit established by FAR 15.903(d)(3)(iii). If the contractor's actual costs incurred on individual delivery orders have consistently been less than estimated, the effective fee earned at the end of the entire contract could be greater than ten percent. In this case, the

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[41] The solicitation/selection process, and the best and final offer will be discussed in Section 4.2.4 Award Method.

final voucher submitted on the contract will make a downward adjustment to the fee, so the total fee earned on the contract will not exceed ten percent of the total costs expended.

Each delivery order includes the LIMITATION OF COSTS (FAR 52.232-20) and LIMITATION OF FUNDS FAR (52.232-22) clauses. The Limitation of Costs clause applies if the order is fully funded at the time of issuance. The Limitation of Funds clause applies if the order is incrementally funded.

The contractor is required to notify the contracting officer in writing when it has reason to believe the following. For the LIMITATION OF COSTS clause:[42]

(1) The costs the contractor expects to incur under the delivery order in the next 60 days (unless varied in the delivery order) when added to all costs previously incurred, will exceed 75 percent (unless varied in the delivery order) of the estimated cost specified in the delivery order;

(2) The total cost for the performance of the delivery order, exclusive of any fee, will be either greater or substantially less than had been previously estimated.

For the LIMITATION OF FUNDS clause:[43]

(1) The costs the contractor expects to incur under the delivery order in the next 60 days (unless varied in the delivery order), when added to all costs previously incurred, will exceed 75 percent (unless varied in the delivery order) of the total amount so far allotted to the delivery order;

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[42] Section G3 "NOTIFICATION REQUIRED UNDER LIMITATION OF COST AND LIMITATION OF FUNDS CLAUSES" of typical Navy pilot Remedial Action Contracts, paragraph (a).

[43] *Ibid.*, paragraph (b).

(2) Sixty days (unless varied in the delivery order) before the end of the period specified in the delivery order, the contractor shall notify the Contracting Officer in writing of the amount of additional funds, if any, required to continue timely performance under the delivery order.

If there is an increase in funds to complete the delivery order, there will be no accompanying increase in the fee. The fee would only be increased if there was an increase to the original scope of the order.

4.2.4 Award Method[44]

The award method, is the method used for selection of the contractor and/or the price. Methods vary from awarding to the lowest qualified bidder on a sealed competitive bid, to negotiating the cost with a single source. Variations can include choosing a contractor on multiple parameters; using an equation (with price, quality, technical factors, and/or time) weighing the parameters with the owners priorities.

4.2.4.1 Source Selection Process

A majority of the work required by the contract is a service rather than a commodity. As a result, there is a need for a differentiated and specialized contractor. The pilot Remedial Action Contracts were awarded through a competitive source selection process which considered both technical and cost factors. Contractors were aware of all the factors considered in the evaluation/selection process, and that technical

[44] This section is summarized from the Navy's Source Selection Plans for pilot Remedial Action Contracts.

factors would be weighed heavier than cost. However, they were not privileged of the exact weighting for each factor. The author cannot disclose the equation used, or the weight of each parameter. This information is deemed "procurement sensitive" by the Navy.[45] However, it can be stated that higher consideration was given for technical merit.

The award process is described below. Once again, due to the sensitive nature, some of the specifics for evaluating a contractor cannot be disclosed. However, enough information will be provided so the reader can have an appreciation for the process, and realize that the criteria used is geared toward effective cleanup of the sites, and not based on awarding to the bidder with the lowest cost.

Initially, a "Source Sought" synopsis was placed in Commerce Business Daily (CBD). This was used to determine contractor interest, and to determine the best way to divide the work into different contracts. The Navy received letters from over 70 firms that showed an interest.

The Navy then decided to divide the contracts by contaminant type, which would allow for a larger number of contractors to compete, and encourage specialized technical expertise on remediating particular contaminants. The Navy also determined that combining contaminant types into a smaller number of large value contracts would severely limit the number of competitors. Had the Navy done so, this may have indirectly encouraged proposers to act as program managers who subcontract the work, rather than performing remedial actions themselves.

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[45] Amy Jones, Contracts Division, Naval Facilities Engineering Command Headquarters, Alexandria Virginia. Summarized from interviews and a site visit of March 25, 1993.

Because the eight initial RACs comprise a pilot program, it was decided to have one entity award and administer the contracts and delivery orders Navy-wide. As lessons are learned from the eight original RACs, future contracts can be refined and awarded by the various Engineering Field Divisions for work in specific geographic regions.[46]

As mentioned previously, contractors are selected based on unrestricted, full and open competition among firms through a competitive source selection process. The method can be considered to be a hybrid of a multiple parameter award. The evaluation of technical merit is essential for successful environmental cleanup. The plan establishes minimum standards of acceptability for technical merit, and a method for evaluating the cost factors.

The Contracting Officer forwards a request for proposal to the requesting firms. The firms submit their proposals with their Taxpayer Identification Number on each page. This method allows the evaluation of a firm's proposal without any bias. The cost and technical portions of the proposal are separated. The Contracting Officer evaluates the price of the proposal, while the Technical Evaluation Board (TEB) reviews its technical merit.

4.2.4.2 Technical Evaluation

The following gives a general description of the factors included in the technical evaluation of the proposals. The weight of each cannot be listed as it is deemed

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[46] The application of future contracts will be discussed in Section 5.4.

"procurement sensitive." In general, the five factor are listed in descending order of importance.

1. COMPANY EXPERIENCE OR ABILITY

This section includes a firm's remediation experience, their access to various technologies, and breadth of technical reporting with the particular contaminant.

2. PERSONNEL EXPERIENCE

This section evaluates the experience and training of personnel, their remedial action experience, and previous technical reporting on the specific contaminant.

3. HEALTH AND SAFETY

This section evaluates the firm's corporate and site specific health and safety plans.

4. QUALITY CONTROL

This evaluates the firm's corporate quality control plan.

5. SUBCONTRACTING

This section reviews the firm's subcontracting plan with FAR 19.704.

The evaluation of the above results in the total technical evaluation points for a specific proposal.

4.2.4.3 Cost Evaluation

The cost evaluation assumes that direct costs for performing the work is essentially the same for all contractors. Two primary areas where costs are expected to vary between firms are the professional labor costs, and indirect costs and profit. These costs are within

the direct control of the proposing contractors. As a result, the cost evaluation of proposals is based on the above two areas.

This evaluation is performed by the Contracting Officer. Indirect costs and profit are evaluated through contractor submittals for three "typical projects" that may be performed under the contract. These projects are located at different sites throughout the country where the majority of the work under the contract is expected to take place. The direct costs are preassigned by the Navy, and are therefore held constant. The contractors propose their indirect costs (overheads, general & administrative expenses, and miscellaneous indirect charges) as well as a profit rate they expect to receive. This information is forwarded to the Defense Contract Audit Agency (DCAA) for an audit of each proposal.

The audit results in a "realism analysis" on each proposal, adjusting the indirect rates accordingly. For example, if the audit shows that indirect costs have been understated, as might be in the case of a cost-plus-fixed-fee proposal, that rate would be adjusted according to the DCAA recommendations. Conversely, if clearly unallowable costs are included in the proposal, the rate is adjusted downward prior to its evaluation.

Upon making these adjustments, the costs proposals are awarded all or portion of the available points for this factor. The lowest realistic offer is awarded the maximum points available. The other offerors are awarded points on their relative position to the low offer.

The evaluation of the professional labor rates are made by having the offerors submit their direct labor rates for the following:

1. Program Manager,
2. Senior Project Engineer,
3. Project Superintendent,
4. Contract Quality Control Representative,
5. Certified Industrial Hygienist,
6. Site Health and Safety Officer,
7. Senior Project Scientist,
8. Staff Engineer,
9. Staff Scientist.

Similarly, as with the indirect rates, the proposed professional labor rates are audited by DCAA, and realistic rates established. The lowest total cost for professional labor rates is awarded the maximum points available for the factor. The remaining proposals will receives points in a manner similar to the one described previously.

4.2.4.4 Contractor Selection

Upon completion of all the analyses, points earned by each offeror are totaled and forwarded to the Source Selection Board. The board will either recommend an award or select a number of offerors within a defined "competitive range" for further discussions. The recommendation is then forwarded to the Source Selection Authority (who is a single

entity): who may elect to award the contract, or decide to conduct discussions with the offerors in the competitive range.

If the Authority elects to conduct negotiations, it does so with all contractors within the competitive range. Prior to negotiations, these contractors are advised which areas of their proposals require further discussion. Upon conclusion of the negotiations, the contractors prepare and forward their Best and Final Offers (BAFOs) to the Contracting Officer for final consideration. The BAFOs are evaluated in the same manner as the initial proposals.

The entire process, from preparing an acquisition plan, to advertising in the Commerce Business Daily, to the final selection of a contractor has typically taken one and a half years.

4.3 Risk[47]

There are several issues regarding risk that an owner should evaluate and understand before developing a contract. First, the risks should be assessed, and then allocated to the party that can best manage them. The risks can be assessed by evaluating the following:

1. The complexity of the project,
2. The completeness or adequacy of documents,
3. The likelihood of changes,

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[47] Drawn from Christopher M. Gordon, P.E., *MIT Course 1.963, Innovative Contract Strategies in the Public and Private Sectors,* (Lecture 8.0), Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, Spring 1993.

4. Priorities (cost, time, quality),

5. The owner's "in-house" skills.

The risk can be allocated by asking the following questions:

1. Who can best manage the risk?

2. Who has the power to control the risk?

3. Who is in the best financial position to handle the risk?

4.3.1 Navy Risk Management

The Navy has managed the risks associated with RACs in the following manner:

1. The scope of work required under RACs is complex and uncertain due to the nature of environmental remediation work in general.[48] The Navy's top priority is quality -- the effective remediation of the site. Cost-plus type contracts manage these risks well. The contracts shift the financial risk of unexpected conditions from the contractor to the Navy. The Navy's risk is controlled by placing ceilings on these contracts, and by incorporating a sophisticated cost and contract oversight program. Contractor productivity is controlled by the Navy Technical Representative (NTR), who is present at the site and monitors the contractor's daily operations.[49] The Navy should be careful that the risk of productivity does not shift from the contractor to the themselves; for this is common in cost-type contracts.

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[48] Uncertainties associated with environmental work is addressed in Section 4.2.1.

[49] Section 4.5 provides a description of the Navy's role in these contracts.

2. Cost-plus type contract provides the contractor with an incentive to complete the work in a quality, timely, and cost effective manner. The contractor receives his profits through a fee that is awarded, and could be considered an incentive. The fee is typically based on an evaluation of contractor's performance. This can include areas such as cost control, timely execution, effective remediation techniques, and safety just to name a few.

3. The Navy uses (task based) performance specifications with RACs. In that, the end product or criteria is known, but there are several methods/alternatives to achieve it. The work performed under these contracts vary as noted in Section 4.2.1. A performance specification encourages innovation, and allows the contractor to choose the method or process that is most efficient to him. Therefore, risk of performance is assumed by the contractor -- the party that is best able to manage the risk.

In contrast, technical (descriptive) specifications describe the manner in which the work is to be performed. The advantage is that the Navy could more easily measure and enforce the terms of the contract. However, a larger disadvantage is that the risk of performance is shifted to the Navy. The contractor is deprived from the flexibility of using a method most efficient to him. This form of specifications would not be advantageous, since the party best able to manage performance is not responsible for it.

4.4 Indemnification

An entire thesis could be written around this subject, and the view of both DoD agencies and firms contracting for various phases of remedial work. This section shall summarize the concerns brought forth by contractors, the Navy, and other DoD agencies. Three specific reports were reviewed in their entirety to better understand issues surrounding indemnification:

1. The U.S. Army Corps of Engineers (Corps) study: *Hazardous and Toxic Waste (HTW) Contracting Problems Related to Surety Bonding in the HTW Cleanup Program.*
2. DoD 1991 report to Congress: *Liability, Bonding and Indemnification Issues for Department of Defense Restoration Program Contractors.*
3. Statements brought forth on March 10, 1992 before *The House Armed Services Committee on Defense Environmental Restoration Program.*

4.4.1 The Corps' Study[50]

The study examined 24 ongoing remedial action and completed Corps HTW construction contracts between 1987-1989. According to the study the average number of contractors bidding per project had decreased, the average cost per project increased, and the time to get each project started had increased. The average number of bids

[50] *Hazardous and Toxic Waste (HTW) Contracting Problems Related to Surety Bonding in the HTW Cleanup Program*, U. S. Army Corps of Engineers, Institute for Water Resources Center, (IWR Report 90-R-1, June 15, 1990).

received per contract dropped from 6.2 in early 1987 to 4.6 in late 1989, and the ratio of award price to government price rose from 0.8 to 1.2.

No significant statistical inferences could be drawn between this data and bonding problems, but there is a trend toward fewer bids on HTW projects. Remedial action contractor associations stated that many firms cannot participate in HTW work because bonding was unavailable. The HTW industry indicated that fewer contractors bid on HTW projects than on non-HTW projects.

The study determined these problems to result from the additional risk associated with HTW projects. However, the contractor's interviewed perceived that the problem arises from the Government's use of contracting procedures developed for non-HTW construction and service contracting, which is inappropriate for HTW contracting.

4.4.2 1991 DoD Report to Congress[51]

The report was initiated due to concerns voiced by contractors who undertake the cleanup under DERP. They had voiced concerns that the program may run into serious difficulties due to unmanageable risks on future contractor liability; and as a result reduce competition, decrease the quality, and increase DoD's cost.

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[51] *Liability, Bonding and Indemnification Issues for Department of Defense Restoration Program Contractors, Fiscal Year 1991 Report to Congress,* Office of the Assistant Secretary of Defense, Defense Environmental Restoration Program Division, Washington D.C., March 1991.

The topics in the report included:[52]

1. The risks and potential liabilities facing such contractors, including analyzing federal and state standards of liabilities imposed on contractors.

2. The availability of normal commercial insurance, surety, bonding, or other financial assurance mechanisms to cover such risks and potential liabilities.

3. An analysis of the differing policies and practices of the different military services concerning the reimbursement or indemnification of response action contractors in lieu of or in addition to such financial assurance requirements.

The comments provided by the remediation construction industry can be summarized as follows: remediation contractors are extremely fearful of the amount and nature of uninsurable risk to which DERP contracts expose them. Representatives of the insurance industry commented that the risks associated with potential third-party liability are uninsurable because of the amount of uncertainties inherent with these contracts. Additionally, sureties dealing with the conventional part of the construction industry have little or no desire to engage in the high risk associated with RACs. To date, only a few sureties provide bonding for remedial work, but at a high cost to the contractor.

To date, DoD has not found it necessary to provide indemnification to obtain qualified contractors for its DERP sites, nor has the DoD adopted any policy with respect to indemnification. The EPA makes indemnification available to its RACs under section 119 of CERCLA. This provides the President with authority to indemnify response action contractors. This indemnification can be applied to releases of pollutants arising out of

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[52] *Ibid.*, p. 3.

response actions at NPL sites. The contractor is not indemnified from his own gross negligence.

Some of the recommendations by the remedial action contractor industry include:

- Implementation of a uniform comparative negligence of liability for remedial work, combined with a uniform statute of limitations or statute of repose;
- Statements limiting the liability of the contractor to a particular amount and over a particular period of time;
- Define in the contract, which party has the responsibility for specific risks.

In summary, the report determined the potential for unmanageable risk as a serious threat to DERP. The report provided many recommendations that would require changes to policy, legislation, contracting practice, and FAR revision. Finally, the report stated that DoD would actively continue its efforts to improve the contracting procedures, and consider the desirability and feasibility of implementing the suggestions of the report.

4.4.3 The House Armed Services Committee Hearing[53]

Industry witnesses testifying before the panel were unanimous in their request for DoD or congressional action to protect environmental cleanup contractors. Specifically, the witnesses requested that contractors be indemnified against strict liability imposed by environmental statutes, and to adopt policies which would limit their liability for negligence to an amount related to the contract fee, and only for a specified time after

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[53] *House Armed Services Committee, Defense Environmental Restoration Panel,* (Meeting Minutes), U.S. Department of Defense, Washington D.C., March 10, 1992.

contract completion. Several witnesses stated that DoD's policy not to provide indemnification inhibits them from bidding on these environmental contracts.

Thomas Baca, Deputy Assistant Secretary of Defense (Environment), testified at the hearing and made his first point, stating that to date, the DoD has not had a problem in obtaining qualified contractors to do environmental work. Nor have any of the military departments voiced concerns in the quality of work being done by contractors for the DoD's cleanup work. However, he stated, that a number of firms were deterred from bidding on DoD contracts that did not provide indemnification. Additionally, Baca acknowledged that there might be some need for contractor liability limits, and that a test program of limited duration and scope would be developed. This program would compare various indemnification strategies and their impact on DoD cleanup.

As an aside, the eight pilot Navy RACs (with an aggregate value of $150 million) were awarded without indemnification. Each RAC received responses from about 15-18 bidders, with about 3-10 contractors making the "final cut" and being in the competitive range for each contract.[54] However, this may be a result of the need for work or other market drivers. As a result, the Navy or DoD should not have a false sense of security, believing that their policy regarding indemnification is "adequate."

[54] Kathy Volpe, Contracts Division, Naval Facilities Engineering Command Contracts Office, Port Hueneme, California. Summarized from interviews and a site visit of May 17, 1993.

4.5 Navy's Role and Responsibilities

As discussed previously, cost-plus type contracts shift some risks from the contractor to the owner. Hence, it is crucial for an owner to incorporate a more sophisticated system to oversee such contracts. This can be accomplished by an outside source or using in-house talent.

The Navy's role in RACs is not that of a regulatory body. The role is by far a "hands-on" approach. Several structured and talented Naval organizations work in concert with remedial action contractors.

In essence, the Navy can be considered to play the role of a construction manager on these contracts. The various organizations play key roles, from preparing the scope of delivery orders, to negotiating the contracts and delivery orders, to reviewing the contractor's technical performance and costs, and the daily administration of these contracts.

The oversight and administration of a RAC is different from a traditional construction contract. Even though there are some similar construction type activities in RACs, there are a great deal of dissimilarities due to the nature of work.

The contract and requirements of the contractor have been described in the previous sections of this chapter. There are three key Naval organizations that are involved with the pilot RACs; Engineering Field Divisions (EFD), Naval Facilities Engineering Command Contracts Office (NAVFACCO), and Naval Energy and Environmental Support Activity (NEESA). The following will describe their roles and responsibilities.

4.5.1 Engineering Field Divisions

The EFDs are the regional contracting organizations under the Naval Facilities Engineering Command. The EFDs primary responsibilities include preparing the delivery order requirements for sites within their region, and coordinating the technical oversight of the delivery orders. Each EFD assigns a Navy Technical Representative (NTR) to perform the technical oversight of the delivery order.

The NTR may be from the EFD or the local Navy construction office. The NTR's responsibilities vary from being involved in negotiations (as required), to daily monitoring of the contractor's work, and receiving Daily Reports.

The Remedial Program Manager (RPM) for a site, in most cases, will be an environmental engineer assigned to the regional EFD. The RPM's period of responsibility begins prior to the remedial investigation and continues through remedial action, and deletion of the site from the National Priorities List (NPL).

4.5.2 Naval Energy and Environmental Support Activity

NEESA provides support for nuclear shore systems, energy conservation, and environmental issues. NEESA provides a multitude of services on RACs including:

- Coordinating, reviewing, and evaluating delivery order requirement packages submitted by the EFDs;
- Providing negotiation assistance as required;
- Reviewing the contractor's technical performance and costs on monthly vouchers;

- Ensuring program compliance with Navy policy, guidance, and environmental laws and regulations.

NEESA assigns the Contracting Officer's Technical Representative (COTR) for each pilot RAC. As the title states, the COTR is the Navy's technical representative for the contract, providing technical direction/clarification. The COTRs are not utilized as contract administrators. This function is filled by NAVFACCO.

4.5.3 Naval Facilities Engineering Command Contracts Office

Among its other responsibilities, NAVFACCO and its staff has been tasked with the negotiation and award of the pilot RACs, and its delivery orders and modifications thereto. The above organizations assist NAVFACCO staff as required. NAVFACCO's Contract Specialists perform typical contract administration duties. These include:

- Review delivery order packages, its statement of work, estimates, and available funds;
- Forward Request For Proposal to the contractor;
- Conduct site visits;
- Negotiate delivery orders;
- Attend pre-construction conferences;
- Administration of delivery orders.

NAVFACCO's Contract Specialists work closely with the COTRs and the Navy's Technical Representatives (who are in the field). "[C]onsistency is achieved on RACs when the team approach is fostered by the three key players -- the contractor's Program

Manager, the COTR, and the Contract Specialist. There must be three way communication at all times. Additionally, the NTR's monitoring of the contractor's daily operations is key."[55]

4.6 Progress of Pilot Remedial Action Contracts

Previous sections presented the framework of the eight pilot RACs. The remaining sections of this chapter will give an overview of all eight pilot RACs, and their progress to date. The contract files show that delivery orders on RACs are broken into two categories -- service and construction.

4.6.1 Service Delivery Orders

Service delivery orders have consisted of the following:

- Development of contractor Health & Safety, Management Information System, Quality Control and other programs required under the contract;
- Site visits;
- Sampling and pre-construction work plans;
- Conducting pilot studies;
- Finalizing a Remedial Action Plan for a site;
- Preparing technology transfer packages.

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[55] Lynn Shusterich, Contract Specialist (Pilot Remedial Action Contracts for Pesticides and Acids, Metals & Bases), Naval Facilities Engineering Command Contracts Office, Port Hueneme, California. Summarized from an interview of June 02, 1993.

The first delivery order awarded on all RACs has been the development of a Health & Safety Plan, Quality Control Plan, and various other plans and programs required under the contract. This allows the contractor to learn the "delivery order" system, and puts in place the required programs for effective contract execution. Examples of two service delivery orders are provided below.

4.6.1.1 A Site Visit Delivery Order

Typical site visit delivery orders are relatively simple. The purpose of site visit delivery orders is primarily for visual inspection of sites before a contractor negotiates a delivery order for other types of services or construction at a particular site. "[T]he site visit delivery orders are considered essential. It is prudent to have all parties visit the site before negotiating environmental related work."[56] The scope of several site visit delivery orders have included other services such as pilot studies, surveys, and pre-construction work plans. Depending on the scope, these types of delivery orders have ranged in cost from $3,000 to $100,000.

The scope states: the location of the visit, number of contractor representatives for the visit, the time frame within which the trip report is due, and estimated costs and associated fixed fee for the site visit.

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[56] *Ibid.*

4.6.1.2 Typical Service Delivery Orders

As previously stated, several types of services can be requested under a RAC. The following is the description of a service delivery order for the finalization of a Remedial Action Plan.

The scope of such an order requires the contractor to provide all labor, equipment, and materials to finalize the Draft Remedial Action Plan in accordance with local, state or federal agency requirements. The order will give further description of the services, which may include items such as preparing a project schedule, obtaining monitoring well data, and conducting pilot test studies. The section labeled Detailed Requirements, provides "detailed" information of the tasks that are described in scope and general description sections of the delivery order. The order also contains general information relating to reference reports, security requirements, military installation regulations, public release information, cleanup requirements, and required submittals. The cost of such delivery orders have ranged from $20,000 to in excess of $400,000.

4.6.2 Construction Delivery Orders

Construction type delivery orders have consisted of various phases of removal and remediation activities and incidental related work at sites. Generally, these types of delivery orders have ranged in estimated costs of $200,000 to in excess of $9.0 million depending on the site, contamination, remediation technique, and contaminated media.

The work under these delivery orders have included activities such as:

- Earthwork,
- Disposal & treatment of contaminated soils,
- Installation of monitoring wells,
- Removal or in place remediation of contaminated media,
- Constructing decontamination facilities,
- Removal of underground storage tanks,
- Site restoration.

4.6.2.1 Typical Construction Delivery Orders

Construction type delivery orders have greater costs associated with them since they perform the actual removal of contaminated media or the remediation of a site. These orders have performance specifications similar to a construction project. Specifications are either generated by the government or CLEAN contractor. The following is the description of a typical construction delivery order for remedial action of an underground storage tank.

Specifications are in accordance with Construction Specifications Institute (CSI) standards. The sections typically used for such work include Division 1 *General Requirements*, Division 2 *Site Work*, Division 13 *Special Construction*, and any other sections that may be required for incidental work, such as Division 16 *Electrical*.

The General Requirements include commonly occurring requirements regarding the following:

- Required administrative or close-out submittals;
- General intent or description of work (remedial action), this section may state different remedial scenarios, which would be determined by the actual site and field conditions encountered;
- Description of contaminants present;
- Specific project information (i.e., drawings, boring logs, reports);
- Availability of utility services and facilities;
- Restrictions on contractor operations;
- Security requirements;
- Meetings, contract programs, and management plans.

The other divisions provide commonly occurring contract requirements pertinent to that section. The removal of underground storage tanks is outlined in Division 13 *Special Construction.*

The following sections provide an overview of the eight pilot RACs, specifically, the delivery orders that have been awarded and those that are anticipated for award. To date, the eight RACs have amassed a total of 36 service delivery orders estimated at $4 million and 20 construction delivery orders estimated at $34.1 million, with remediation complete at four sites.

The Naval Facilities Engineering Command Contracts Office is negotiating an additional 50 delivery orders estimated at $35 million on the pilot RACs between May and

September 1993. The actual number of delivery orders negotiated is increasing daily. As a result, the following information is current as of May 1993.

4.6.3 Pilot Remedial Action Contract for PCBs

The contract for PCBs was awarded to International Technology Corporation of Pennsylvania in the sum of $15 million. To date, ten delivery orders have been negotiated totaling $20,341,910. Of these, six are service type orders with an aggregate sum of $2,019,666, and four are construction type orders with an aggregate sum of $18,322,244. The total value of delivery orders exceeds the initial contract ceiling amount of $15 million. As a result, additional funding has been provided for this contract. This is the only RAC that has exceed its ceiling. Funds in the sum of approximately $10 million are being added to the ceiling for the remaining delivery orders.

The delivery orders have included contract programs and management plans, site visits and surveys, and removal or remediation of PCB contaminated media. Removal of PCB contaminated soil at sites in Washington and Virginia have been completed at an aggregate estimated cost of $11.1 million. The site in Washington consisted of removing the soil off location, followed by incineration. The contaminated soil at the later site was disposed of in a landfill. Two additional delivery orders estimated at $7.0 million have been negotiated for remediation of PCB contaminated soils in Guam and Florida.

Three additional orders estimated at $350,000 are being prepared for negotiation during fiscal years 1993 and 1994. These future delivery orders are primarily for work plans.

4.6.4 Pilot Remedial Action Contract for POLs (Clean)

The contract for POLs (clean) was awarded to Groundwater Technology Government Services of Pennsylvania in the sum of $20 million. To date, twenty one delivery orders have been negotiated totaling $7,762,421. Of these, sixteen are service type orders with an aggregate sum of $1,229,237, and five are construction type orders with an aggregate sum of $6,533,184. The value of delivery orders negotiated is less than half the contract ceiling amount of $20 million.

This contract has had the most number of delivery orders placed against it. In addition to the standard orders for contract programs and management plans, orders include pilot studies, addendum to Remedial Action Plans, and removal of underground storage tanks (USTs). A delivery order estimated at $1.0 million resulted in the removal of seventeen USTs at a site in California. Delivery orders are in place for removal/remediation, site visits, and pilot studies of contaminated media at sites in California, Virginia, Maryland, Nevada, and Midway Island.

Twenty two additional delivery orders estimated at $13.8 million are being prepared for negotiations through fiscal year 1994. One of these delivery orders is estimated at $8.0 million for the removal of USTs in Guam.

4.6.5 Pilot Remedial Action Contract for POLs (Mixed)

The contract for POLs (mixed) was awarded to OHM Remedial Services Corporation of Ohio in the sum of $40 million. To date, twelve delivery orders have been negotiated totaling $4,066,153. Of these, three are service type orders with an aggregate

sum of $388,454, and nine are construction type orders with an aggregate sum of $3,677,699. The value of delivery orders negotiated is approximately 10 percent of the contract ceiling amount of $40 million.

In addition to the standard orders for contract programs and management plans, orders include pilot studies, site visits, and addendum to remedial action plans. Delivery orders are in place for sites in Tennessee, Virginia, Washington, Florida, and Puerto Rico.

Thirteen additional delivery orders estimated at $12.8 million are being prepared for negotiations through fiscal years 1993 and 1994. Several additional delivery orders will be negotiated before this thesis is complete.

4.6.6 Pilot Remedial Action Contract for Pesticides

The contract for pesticides was also awarded to OHM Remedial Services Corporation of Ohio in the sum of $10 million. To date, only two delivery orders have been negotiated totaling $5,130. Both are service type orders for contract programs and management plans, and a site visit to Virginia. Four other delivery orders estimated at $1.6 million are being prepared for negotiations by the end of this fiscal year. This contract has not been as active due to a fewer number of Navy/Marine Corps sites having pesticides as the predominant contaminant.

4.6.7 Pilot Remedial Action Contract for Acids, Metals & Bases

The contract for acids, metals, and bases was awarded to Ebasco Environmental of California in the sum of $25 million. To date, three delivery orders have been negotiated

totaling $2,143,411. Of these, two are service type orders with an aggregate sum of $143,411, and one is a construction type order estimated at $2.0 million. The value of delivery orders negotiated is less than 10 percent of the contract ceiling amount of $25 million.

The delivery orders are for contract programs and management plans, site visits and studies, and removal of asbestos. The delivery orders have been for sites in Florida.

Five delivery orders estimated at $2.1 million are being prepared for award by the end of this fiscal year. Three of these orders, estimated at $1.8 million are for remediation, with the remaining two sites requiring pilot studies and monitoring with an estimated cost of $300,000.

4.6.8 Pilot Remedial Action Contract for Paints & Solvents

The contract for paints and solvents was also awarded to International Technology Corporation of Pennsylvania in the sum of $10 million. To date, five delivery orders have been negotiated totaling $2,246,097. Of these, four are service type orders with an aggregate sum of $78,815, and one is a construction type order at $2,167,282. The value of delivery orders negotiated is approximately 20 percent of the contract ceiling amount of $10 million.

The delivery orders have included contract programs and management plans, site visits and surveys, and remediation by "Pump and Treat" of contaminated ground water. The estimated $2.2 million "Pump and Treat" construction delivery order in Washington was negotiated in December of 1992. The contractor will begin construction in October

1993, with remedial action projected to be complete by mid 1994. Other delivery orders have included services at sites in California and Guam. Four other delivery orders estimated at $1.5 million are being prepared for negotiations by the end of this fiscal year.

4.6.9 Pilot Remedial Action Contract for Ordnance

The contract for ordnance was awarded to Fluor Daniel of California in the sum of $15 million. To date, no delivery orders have been negotiated. The two delivery orders that are scheduled for negotiations are service type orders for contract programs and management plans, and a site visit to Virginia. The estimated value of these orders is $105,000. This contract has not been as active due to a fewer number of Navy/Marine Corps sites having ordnance as the predominant contaminant.

4.6.10 Pilot Remedial Action Contracts for Combined Wastes

The contract for combined wastes was the third RAC awarded to International Technology Corporation of Pennsylvania in the sum of $15 million. To date, four delivery orders have been negotiated totaling $1,614,168. Of these, three are service type orders with an aggregate sum of $175,514, and one is a construction type order at $1,438,654. The value of delivery orders negotiated is approximately 10 percent of the contract ceiling amount of $15 million.

The delivery orders have included contract programs and management plans, site visits and surveys, and removal of combined wastes. Remedial action of combined wastes

at this Washington site will include buried drums, contaminated soils, and stockpiles of metals, tree roots and soil. The contractor is in the process of site mobilization.

Other delivery orders have included services at sites in Virginia and Florida. Eight additional delivery orders estimated at $4.6 million are being prepared for award through fiscal years 1993 and 1994. One of these delivery orders is for interim remedial action at sites in Virginia estimated at $3.2 million.

4.7 Advantages of Pilot Remedial Action Contracts

The Navy demonstrated its ingenuity in using an alternative contracting method for the pilot RACs. Cost plus type contracts were chosen after recognizing the complexity and uncertainties inherent of environmental remediation. Additionally, the contract framework makes the Navy share more of the financial risk with the contractor, than it would have with a "traditional" firm fixed price contract. This was a reasonable approach due to the inherent complexity and uncertainties involved.

The Navy chose a fixed fee because several Engineering Field Divisions, local activities, and organizations within Naval Facilities Engineering Command would administer these contracts. They realized by having several organizations involved, it may not have been possible to obtain a fair, consistent, and timely fee determination process for an award type fee.

The selected award method shows the Navy considered the complexity of the work, and determined it to be more than a "commodity." They recognized that the contracts would be highly complex in nature, and would require contractors with highly

specialized and technical skills. The contractors would also need to be experienced and well versed in environmental policies and regulations. As a result, the Navy chose a source selection process with greater emphasis on technical merit, than awarding a contract based on the lowest bid price.

4.8 Disadvantages of Pilot Remedial Action Contracts

These contracts were pilots for the Navy to perform remedial action. As a result, the Navy and its contractors are continually learning and improving the process.

Future contracts will limit the scope by geographic regions. "[I]t has been challenging administering the pilot RACs at sites throughout the United States and its territories."[57] The parties involved in the contracts include: COTRs and Contract Specialists from California; contractor personnel at the sites, and from head offices; and Navy personnel at the sites or from regional Engineering Field Divisions. Limiting the scope by geographic region will allow synergy, by assigning several Naval personnel from the same organization.

The Navy chose a suitable alternative contracting method for the pilot RACs. However, they may have underestimated the staff and training required to administer these contracts. "Cost type" contracts need a stronger amount of contract monitoring compared to "traditional" fixed price contracts. Currently, Navy contract administrators are managing this added workload. Future EFD contracts should thoroughly review the

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[57] Kathy Volpe, Contracting Officer, Naval Facilities Engineering Command Contracts Office, Port Hueneme, California. Summarized from interviews and a site visit of May 17, 1993.

staffing needs when implementing cost type RACs in addition to their ongoing CLEAN contracts.

Training of personnel is another issue. In a climate of down sizing and budget cuts, minimal funds exist for training. Adequate training of personnel in the environment, environmental policies and regulations, and "cost type" contracts is a must for an effective program. Additionally, the author's interviews determined that some administrators have service contract backgrounds, and are faced with administering construction delivery orders or vice a versa. This is expected, but once again, adequate training of personnel is a key issue. At times, offices are limited to sending one person to a formal training course, followed by training the remaining personnel by "in-house" informal training. This method is better than no training at all. In addition, NTR training is essential. These individuals are key in oversight of the contractor's productivity and daily operations. The Navy's ability to control contractor productivity is critical for cost-type contracts.

The Installation Restoration Program is an important program; the same emphasis should be given to adequate staffing and training, as is given to the remediation of sites. Remedial Action Contracts aren't the same as "traditional" construction, and can't be considered as such.

Pilot RACs haven't remediated many sites since their award. The process has been slower than anticipated due to the need for further studies, before the actual remediation. Contract modifications to have RAC contractors, the Navy, and CLEAN contractors work in concert, similar to the concept of partnering, will only accelerate the process.

4.9 Chapter Summary

This chapter has shown that the Navy has taken a complex issue, and developed a suitable contracting method to meet the needs of the future. The pilot RACs are "moving" in the right direction; but improving future RACs by lessons learned from the pilot RACs is critical to program success.

The use of design-build is not generally permitted under the Federal Acquisition Regulation. However, discussions on its application will be addressed in Chapter 5. An analysis of the various project drivers indicate that the current cost-plus-fixed-fee with a general contractor is "suitable" for such work. However, Chapter 5 will discuss the use of construction manager or design-build organizations, combination of unit prices, partnering, and cost-plus-award-fee contracts as an alternative to current methods; and provide recommendations for future Remedial Action Contracts that will be awarded by various Engineering Field Divisions.

5

Recommendations for Remedial Action Contracts

5.1 General

This chapter begins by (a) assessing project, owner (Navy), and market drivers; (b) evaluating the various contracting organizations that could be considered; and (c) comparing these to the one that was used on the pilot RACs. This chapter then reviews the RACs that each EFD is preparing for award, and describes how they have evolved from the pilot RACs.

5.2 The Most Suitable "Contract" Framework for Remedial Action Contracts

The objective is to start with a clean slate and determine the "most" suitable contract organization(s), type and award method(s) for RACs. This will be compared to the actual framework of pilot RACs described in Section 4.2.

Selection of the recommended contract organization(s) is based on an assessment of project drivers, owner (Navy) drivers, and market drivers. Recommended contract type and award methods are based on general criteria described in Sections 4.2.3 and 4.2.4, respectively.

5.2.1 Contract Organization

There are no equations or formulas that will result in choosing the "best" contract organization. One method for selecting the "most" appropriate organization(s), is based on assessing the project, Navy, and market drivers for a project.[58] This allows an owner to evaluate various contracting organizations based on the relevance of the stated drivers; and not selecting an organization based primarily on old practices and tradition. Such an assessment may result in a few organizations to choose from; from which one may be the "most" suitable.

5.2.1.1 Project Drivers

Time Constraints - The Navy must determine if time constraints are important to site remediation. Will the Navy be satisfied with these contracts being conducted on a normal schedule, or is a fastrack schedule (overlapping design and remedial action) more desirable? Several factors lead to time constraints being an important driver. To date, the Navy has been pressured from both DoD and citizens, to shift from site studies to site remediation. Many sites were contaminated several decades ago, and as a result, contaminants have migrated over large areas. Timely site remediation should be a key factor for an effective Installation Restoration Program.

Flexibility Needs - The Navy must decide if there is a likelihood of changes or uncertainties during the life of RACs. The size and complexity of projects may favor flexibility during the construction process. This results from the likelihood of changes and

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[58] Gordon, P.E., *Course Notes...* (Lectures 10.0 & 11.0).

uncertainties associated with environmental restoration. As a result, flexibility is also an important driver.

Pre-construction Service Needs - The Navy must determine the value of pre-construction services from perspective remedial action contractors. The Navy must decide how important constructability reviews, value engineering, and advice on remediation technologies and design are to the remediation of sites. It would seem prudent to receive pre-construction services due to the complexity inherent with such work.

Design Process Interaction - The Navy must determine how much interaction they will want to have during the remedial design phase. Site remediation is a new and evolving area for Navy contracts, and is structured around cost-plus type contracts. As a result, the Navy may want design process interaction to monitor methods and technologies to be used.

Financial Constraints - This factor is not applicable to the Navy. Such a factor would be more appropriate for a country or government that had little or no financial capabilities. In such a case, an owner may opt to have the contractor finance the project, such as a build-operate-transfer team.

Having assessed the above project drivers, Table 5.1 can be used to determine the "most" suitable organizations. The most common organizations to choose from are the following, based on either a fixed price or reimbursable type contract, as applicable:

- General Contractor,
- Construction Manager,

- Design-Build Team,

- Multiple Prime Contractors,

- Turnkey Team,

- Build Operate Transfer Team.

Based on the above evaluation, the five project drivers that are considered to be controlling factors for RACs are:

- Need for a fastrack schedule,

- Need for flexibility during construction,

- Need for pre-construction advice from the remedial contractor,

- Need for design interaction,

- No need for outside financing.

The assessment of project drivers determined (a) a general contractor on a reimbursable basis (which is the organization used on the pilot RACs); (b) a construction manager; or (c) a design-build team on a reimbursable basis to be the "most" suitable contract organizations.

Table 5.1 Project Drivers vs. Organization Matrix[59]

DRIVERS	GC/FP	GC/R	CM	MP	DB/FP	DB/R	T/FP	T/R	BOT
Fastrack Schedule *		X	X	X	X	X	X	X	X
Sequential Schedule	X	X	X	X	X	X	X	X	X
More Flexibility *		X	X	X		X		X	
Less Flexibility	X	X	X	X	X	X	X	X	X
Pre-Con Advice Needed *		X	X		X	X	X	X	X
No Pre-Con Advice Needed	X	X	X	X	X	X	X	X	X
Design Interaction *	X	X	X	X		X		X	
Less Design Interaction	X	X	X	X	X	X	X	X	X
Need Construction Finance							X	X	X
Need Perm. Finance									X
Owner Finance *	X	X	X	X	X	X			

LEGEND

GC General Contractor

DB Design Build Team

CM Construction Manager

T Turnkey Team

MP Multiple Prime Contractors

BOT Build Operate Transfer

FP Fixed Price

R Reimbursable Price

* Controlling Project Drivers from the assessment in section 5.2.1.1

▒ Denotes organizations that may be the "most suitable"

[59] Gordon, P.E., *Compatibility of* ...p. 154.

The following sections evaluate Navy and market drivers, and determine if any of the above organizations can be eliminated.

5.2.1.2 Owner Drivers

Construction Sophistication - The Navy has a strong and knowledgeable organization that has been responsible for construction and its administration since 1842. However, the Navy has relatively limited experience and knowledge in the areas of environmental remediation and cost type construction contracts. Continued training programs dedicated to environmental restoration/remediation and cost type construction contracts may resolve this deficiency.

Current Capabilities - As stated previously, the Navy has a sophisticated construction organization. However, they have limited experience in the environmental arena, and are already tasked with various construction/administration responsibilities. Additionally, the DoD is undergoing a reduction in forces and staffing. As a result, most offices are facing higher workloads with greater areas of responsibility. The areas that have been difficult during the administration of RACs and CLEAN contracts for the Navy include:

- Experience with cost type construction contracts,
- Resources to administer Cost Plus Award Fee type contracts,
- Training for Navy Technical Representatives,
- Complicated cost accounting system,
- Complicated invoicing procedures,

- Site monitoring.

These difficulties may primarily be due to the fact that many of the personnel administrating RACs, are those which to date have a stronger background with "traditional" firm fixed price construction, or cost type service contracts. Time, training, and specific organizations to oversee such contracts seem to be one of the solutions.

Risk Aversion - As mentioned previously, financial constraints are not a factor. However, the Navy will still want to implement cost controls. Contractors are aware that sites must be cleaned up and that funds will be available for site remediation. The Navy will want to avert as much risk as possible, and eliminate the temptation of the contractor to implement more costly remediation techniques. To do so, the Navy monitors the contractors costs and has design process interaction with the CLEAN contractors.

Restriction on Methods/Other External Factors - The primary restrictions are those set for public procurement by the Federal Acquisition Regulation (FAR) Clauses. Specifically, FAR 9.507 which describes the minimum solicitation provisions and contract clause requirements that must be addressed. This clause precludes the use of design-build. "[T]he FAR clauses which relate to construction were written for "traditional" construction, but are being used for environmental remediation; the FAR clauses need to be revised to address the unique issues around environmental work."[60]

The primary external factors would include the requirements of using small business and disadvantaged contractors for public work. However, these contractors may

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[60] Linda Geldner, Section Head, Navy Region III Removal Action Tiger Team, Southwest Division Naval Facilities Engineering Command, San Diego California. Summarized from a site visit and interview of May 18, 1993.

not meet the experience qualifications, or have the depth and sophistication required for remedial contracts. These contractors could act as subcontractors on RACs, or possibly use joint ventures to compete for remedial action contracts.

5.2.1.3 Market Drivers

Availability of Appropriate Contractors - There are a sufficient number of contractors that are experienced in the environmental arena. Furthermore, an adequate number have responded to Navy solicitations. As the program evolves and continues to improve, it is likely that more contractors will seek environmental restoration projects with the Navy or other DoD components. As stated in Chapter 3, there is a large market of such work.

Current State of the Market - Both, public and private sectors are faced with similar issues in cleaning up their toxic legacy due to past practices. Market forces will in time create the "most" efficient method for environmental work.

Package Size of Project - The eight pilot RACs are written such that, any one contractor can be tasked to work on any Navy or Marine Corps installation throughout the United States and its territories. Additionally, each RAC deals with a specific contaminant type. Future RACs will be written so they are site specific by geographic regions. This will reduce the oversight requirements by not having a single contractor potentially working at sites at any Navy or Marine Corps installation. This would be administratively easier for both the contractors and Navy. Future RACs will be written such that a single contract will be capable of dealing with more than one contaminant type;

thus, reducing the likelihood of having more than one contractor involved in the remediation activities for a given site. Lessons learned and feedback from contractors and contracting officers should be taken into account when packaging future RACs.

The assessment of the various drivers; project, Navy, and market, describe concisely that a general contractor on a reimbursable basis, a construction manager, or a design-build team on a reimbursable basis are the "most" suitable organization for remedial action contracts.

5.2.1.4 Construction Manager

Using a construction manager (CM) organization for RACs is not an attractive alternative for the Navy, since the Navy has a sophisticated staff that serves as construction managers on its projects. Contracting with another entity for this task would not be cost effective. However, as mentioned previously, the Navy needs to ensure that adequate training is provided for all Naval personnel that manage and administer these projects.

There are presently only a finite number of firms that have substantial practical experience in the environmental arena. Therefore, a firm that provides CM services is most likely one that also has experience in remedial design and/or remedial action. As a result, conflicts of interest may arise if a CM hired by the Navy is assigned to oversee a competing contractor.

5.2.1.5 General Contractor or Design-Build

The other remaining organizations (a general contractor (GC) or a design-build (DB) team, both with a cost plus contract) are also "suitable" for environmental work. The Navy currently uses a GC with a cost plus type contract. One must ask if a GC organization was selected due to the requirements of the FAR, or because the Navy is simply used to "doing" business this way. The current method is "suitable," but there are some distinct advantages of using an alternative design-build approach:

1. Design-build allows the use of a fastrack schedule.
2. Design-build permits the Navy to have a contract with one entity for both design and construction.
3. With design-build one party is responsible and accountable for the entire restoration effort -- from studies, to design and remedial action.
4. Design-build eliminates the potential adversarial relationship that can exist between designer and contractor.
5. Design-build can help reduce project duration by eliminating the time required for separate contractor and designer selection.
6. Costs to the Navy due to omissions in the design are eliminated.
7. In design-build the cost type nature of the contract makes changes in design easier to handle. The close association and coordination between all parties allows for quicker response to design and construction problems.

However, there are some disadvantages of using a design-build team on a cost type basis:

1. The cost of the remediation is not known up front.

2. There is a need for stronger Navy management systems to monitor cost and contractor performance than with a firm fixed contract.

3. The fee structure should be selected to give the contractor an incentive to "effectively" remediate sites while minimizing cost.

4. The Navy has lost the design professional's fiduciary relationship of advice and checks and balances on the contractor. There may be concerns of conflicts of interest; is the design being "gold plated?"

5. The use of design-build is not generally permitted under the FAR.

There are several ways to reduce the effect of these disadvantages. Initially, the Navy must have in place a contract administration and technical staff that is knowledgeable in cost-plus construction and service type contracts, environmental policies, regulations, technologies, design, and remediation. Such a degree of sophistication in environmental restoration would allow the Navy to monitor the contractor, and put in place a staff comparable to the complexity of the contracting method. There also needs to be a streamlined and easily usable cost accounting system, that allows the Navy to have the sophistication and knowledge to determine what the contractor is "giving them."

There are concerns of how to contract with a design-build team when it is not generally permitted under the FAR. The U.S. Army Corps of Engineers is in the process of awarding four new types of contracts called Total Environmental Restoration Contracts (TERCs). Each contract will use the services of one contractor for pre-design activities, design, remediation, and short term operation & maintenance. These contracts will be

cost reimbursable using either a fixed fee or award fee. The contracts will have a four year term with two three-year options. The contract dollar amounts are being established based on anticipated requirements. The estimated aggregate sum of the ceilings is $650 million. Additionally, the Corps is aggressive in the utilization of small and disadvantaged businesses with TERCs. The teaming of and with these firms will likely be a consideration in the evaluation of a potential TERC's proposal.

In the Corps' view, remedial design is incidental to the overall remediation to the site. As a result, TERCs are construction type contracts with design being considered an incidental part of the contract. The methodology of TERCs was approved by the Army legal staff, and received final approval from the Assistant Secretary of Army (Research, Development & Acquisition).[61]

All the DoD agencies will be watching the progress of the TERCs over the next several years. There is a strong likelihood that these contracts will be successful, and open a new frontier for public environmental restoration.

5.2.2 Contract Type

Due to the uncertainties involved with the scope of remedial action contracts, cost type contracts are more appropriate than firm-fixed price contracts for hazardous waste cleanup.[62] These uncertainties include characterizing the subsurface media, and nature and extent of subsurface contaminants.

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[61] Robert J. Friedrich, Procurement Analyst, Office of the Assistant Secretary of Army (Research, Development & Acquisition), Falls Church, Virginia. Summarized from an interview on June 9, 1993.

[62] Section 4.2.3 describes the various types of contracts.

If firm-fixed-price contracts were used, the contracts would either be modified extensively due to the unforeseen nature of the work, or the contractor's price would include large contingencies for uncertainties. Neither of these situations are desirable from the Navy's point of view. As previously stated, the advantages of cost-plus contracts include:

1. Using a fastrack schedule.
2. Obtaining Pre-construction advice from the contractor.
3. Easily accommodating changes by the Navy.
4. Replacing the typical adversarial relationship with a teamwork approach.
5. If properly managed by a sophisticated owner, such as the Navy, costs can be reduced by the elimination of contingencies, claims, and bidding process.

The disadvantages of cost-plus contracts include:

1. Not knowing the total cost before the start of construction. This can cause financing and other problems.
2. Owners such as the Navy must be sophisticated and heavily involved to minimize overcharging, unnecessary delays, and uncompetitive purchasing.
3. Competition on contracts may be reduced by the elimination of lump-sum bidding; this can be mitigated by bidding subcontracts.
4. The Navy must analyze which cost-plus arrangement (fixed fee or award fee) provides better incentive on contractor productivity.

The above disadvantages can be reduced by implementing strong contract site monitoring, cost accounting procedures, and adequate training for all Naval personnel. Additionally,

the contractor is provided an incentive by the fee that is associated with the "cost type" arrangement.[63]

5.2.3 Award Method

An appropriate award method would be one based on both technical merit and cost.[64] The Environmental Protection Agency (EPA) has nine criteria for evaluating remediation:[65]

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance;
- Community Acceptance.

Many of the above criteria may be driven by the experience, technical knowledge, and abilities of the contractor. The primary consideration in site remediation should be the effective and timely cleanup of a site. The cost should be secondary, as long as "adequate" monitoring and cost controls exist. A multiple parameter award method

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[63] The discussion of which type of fee to use on RACs is deferred to Section 5.3.1

[64] Section 4.2.4 describes the various award methods.

[65] 40 CFR 300.430

should be used for RACs. Such a method evaluates several factors, in addition to cost before selecting a contractor for award.

The Navy has taken the correct approach in the award/selection process of remedial action contractors. The Navy is using a multiple parameter award method to evaluate the contractors' technical and cost proposals. This method has evolved since the award of the pilot RACs.

Due to the findings of a report by the Assistant Secretary of the Navy,[66] future contractor selection evaluations will be in a narrative form and not only based on "points." This change has come about through experience with point based systems. At what numerical value should the competitive range of contractors be drawn? What if a contractor is only a few points below the "cutoff?" Is it "fair" to remove such a contractor from the competitive range? These and similar concerns have led to the new evaluation method.

In summary, the overall strategy of giving technical merit more weight than cost is correct for cost type contracts and environmental remediation.[67] Experience and time will determine the "most suitable" factors to be evaluated and the exact details for the evaluation method; but the Navy should experiment and analyze with various methods. The selected method must show fairness, but also some subjectivity in evaluating the required sophistication of potential contractors.

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[66] Linda Geldner, Section Head, Navy Region III Removal Action Tiger Team, Southwest Division Naval Facilities Engineering Command, San Diego California. Summarized from a site visit and interview of May 18, 1993.

[67] Section 4.2.4 presents an in-depth presentation of the topic.

5.3 Recommendations for Remedial Action Contracts

Naval Facilities Engineering Command (NAVFAC) and its components have done well in entering the arena of environmental restoration contracting. The Navy selected an appropriate contract organization, type, and award method for environmental contracting. As described previously, the following positive changes have been made for future Navy RACs:

- Limiting contract scope to geographic regions,
- Having each contract capable of remediating all contaminants (except ordnance and nuclear waste),
- Writing the contracts as construction type contracts.

The future RACs will be cost-plus-award-fee contracts. NAVFAC views this structure as providing greater incentive for the contractor. The goal is to negotiate a zero base fee. Using the entire potential fee as an Award Fee provides maximum incentive to the contractor. This method is similar to the goals of the Navy's CLEAN contracts.

5.3.1 Award Fee vs. Fixed Fee

There are some concerns with the award fee structure:

1. For instance, is there adequate staffing, training, and experience to administer/evaluate the award fee process?
2. At what intervals will the contractor's performance and award fee be evaluated? Will this time period to comparable to the time period of typical delivery orders?

3. Does the greater incentive of a cost-plus-award-fee contract outweigh the administrative requirements of such a contract; or does the lesser administrative requirements of a cost-plus-fixed-fee contract outweigh the perceived lower incentive to the contractor?

There are two schools of thought regarding which fee structure to use. Many Navy contracting personnel state that while the cost-plus-award-fee structure provides a greater incentive to the contractor, they are concerned with the Navy's increased administrative requirements for such contracts.

Others state that cost-plus-award-fee contracts are too complex, and that cost-plus-fixed-fee contracts provides similar incentive with much less administrative requirements. Individuals state that cost-plus-fixed-fee can work well if there is a "good" team for the Navy, who are able to negotiate well and provide "strong" oversight and monitoring.

The author's opinion is that cost-plus-award-fee contracts can provide greater incentive to the contractor, by better controlling his productivity. However, the Navy must provide adequate staffing and training to administer these contracts. Otherwise, the Navy may find themselves in a situation of awarding the entire fee to the contractor, instead of being burdened with the complex requirements of evaluating an award fee commensurate to a contractor's performance.

5.3.2 Adequate Training

An area that requires greater attention during this period of budget cuts is training. Environmental restoration contracting is markedly different than contracting for "traditional" construction. The success of the program will not be determined solely by the choice of an innovative contracting method, but by the individuals tasked to provide technical, contractual, and daily site monitoring. An aggressive training program should be put in place before any future contracts are awarded. For example, the Army has already begun training personnel to administer the new TERCs. These contracts aren't expected to be awarded until September 1993.

The new RACs will include a much greater involvement of staff from the local Navy contracting offices near the sites. The personnel from these offices will require training in environmental restoration contracting. In addition, several EFDs will be delegating Administrative Contracting Officer (ACO) authority to the local field offices. Delegating specific contracting authority (after award) to the field can only add efficiency to the process.

5.3.3 Unit Prices and Historical Data

The Navy currently has some fixed-fee, unit price, indefinite-quantity type contracts in place for underground storage tank removal/remediation.[68] Unit prices for quantifiable tasks can reduce financial risk to the Navy, increase control over contractor productivity, while reducing the administrative burdens typical of purely "cost type"

[68] Section 5.4.1 provides a description of these contracts.

contracts. The Navy should consider the combination of a "cost type" contract with unit prices for tasks that can be quantified.

Implementing such a contract would require time to gather typical cost data for work that can be quantified. Based on discussions with personnel from the Navy and other DoD components, an all encompassing historical database for environmental restoration does not exist. Initially, all DoD components should be using the same cost accounting and work breakdown structure. If such a system was implemented, all components could gain from one another's experiences. This may also lead to better government estimates, and in time allow tasks with less uncertainty to be contracted using unit prices. Having a uniform system throughout the DoD would be beneficial to contractors who may pursue to contract with more than one DoD component.

5.3.4 Design-Build Approach

An area that should be investigated further is the use of one entity for the entire restoration process, from pre-design activities through remedial action. The pilot RACs have required additional site studies and investigations to those previously performed by the CLEAN contracts. Additionally, only four sites under the pilot RACs have been remediated. The solution may be to use a design-build approach, as the Army is now implementing. The Navy, along with other components of the Armed Forces', should monitor these contracts as they evolve.

The ideal solution may be to adopt a similar contract framework, upon the anticipated success of the Army's new program. There are many benefits of contracting

with a single entity.[69] However, its implementation will require stronger controls and sophistication by any owner. Remedial action contractors, CLEAN contractors, and Naval personnel state that it would be beneficial to use a "design-build" approach.

The Navy is familiar with the concept and success of design-build as seen on two projects: design and construction of a Family Service Center in Newport, Rhode Island; and a Child Development Center in Brunswick, Maine. The project benefits included:[70]

- Significantly reducing procurement time compared to "traditional" construction methods;
- Requiring little or no increase in the level of effort from the government;
- High quality projects with significant cost savings;
- Allowing the contractor the freedom to use familiar methods, equipment, and materials;
- Minimizing design/construction conflicts, by having the designer and builder work as a team.

5.3.5 Implement Partnering

Partnering is an attitude. It is a way of doing business with a contractor or customer that recognizes that each has common goals which can be achieved through cooperation and open communications.[71] According to Frank Muller, President, Metro

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[69] Section 5.2.1.5 provides the advantages of using design-build for environmental restoration contracting.

[70] Briggs, James M., P.E., and LT Alan M. Wironen, CEC, USN, P.E., "Newport Design/Build: A Winner for the Government and the Contractor," *Navy Civil Engineer*, Winter/Spring 1993, pp. 21-24.

[71] A Guide to Partnering for Construction Projects, U.S. Army Corps of Engineers, Mobile District, January 1990.

Mediation Services, Ltd., New York, "The concept is based on claims prevention and dispute avoidance, rather that dispute resolution."

The concept of partnering is nothing new. As stated by the Associated General Contractors President, Marvin M. Black, "It's getting back to the old fashioned way of doing business with a handshake and taking responsibility for what you do."

Partnering recognizes the common goals of all parties to create synergy. The Navy's goal is to have effective, timely, safe, and cost effective site remediation. The contractor's goal may be to maximize his fee and satisfy the Navy, so as to enhance future business opportunities. These aren't conflicting goals. They go "hand in hand." Partnering provides a vehicle to enhance and accomplish these similar goals.[72]

Partnering is established through a facilitated process. It normally consists of organized workshops to bring the participants together. Partnering can help eliminate an adversarial relationship by the "team approach." This would work well on "cost type" contracts, since the nature of these contracts reduces an adversarial relationship from developing.

Partnering may be best suited for large complex projects, or those with a great deal of uncertainty and risk. The U.S. Army Corps of Engineers have been successful in their implementation of partnering.

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[72] Peter Mueller. *The Public Sector Construction Industry: Analysis of Single-Project Partnering.* Thesis submitted to the Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge Massachusetts, December 1992.

To date, all projects with partnering have resulted in:[73]

- zero claims,

- average reduced schedule of 26%,

- cost growth reduction of 7%,

- value engineering savings of 2%,

- modifications reduced by 29%,

- paper reduction of 66%.

Partnering is successful because it fosters positive attitudes, commitment of common goals, fair contract execution, project focus, problem resolution, timely decisions, and reduced delays.

The Navy has been successful with its application of partnering. To date, the various EFDs have incorporated the concept of partnering on eight large and complex construction projects. These projects have ranged in value form $19-300 million, with an aggregate sum of $671 million.

The concept may work well on environmental restoration, with benefits including better sharing of risk, and reduced costs, paperwork, and schedule.

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[73] Presentation by Peter Mueller, *MIT Course 1.481, Research Seminar in the Construction Industry*, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, October 07, 1992.

5.3.5.1 Partnering Applied to Environmental Restoration[74]

The Aluminum Company of America (Alcoa), Camp Dresser & McKee Inc. (CDM), and Morrison-Knudsen (MK) are breaking new ground by applying partnering to environmental restoration. The site cleanup is at Alcoa's manufacturing site in Massena, New York. Alcoa is faced with the remediation of 14 different disposal areas, including over 37 acres of landfill area and 110 acres of lagoons. The tasks under a 10-year schedule include:

- remediation of soil contaminated with PCBs,
- landfill and lagoon closure,
- construction of a RCRA and TSCA approved landfill,
- removal and remediation of soil, sludge, and sediments.

The remediation can be described as a project with multiple sites, undetermined quantities of contaminated media, unspecified remediation methods, and a large volume of work to be contracted.

The team of Alcoa, CDM, and MK conduct regular meeting that include, constructability reviews, alternatives analysis, and value engineering. The "team approach" has allowed for sharing in the responsibility of the final outcome of each project. Additionally, this has allowed key design and construction decisions to be made early in the process. This has resulted in lower risk, fewer design changes, and reduced costs.

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[74] *Industrial Partnering Drives Alcoa Site Cleanup*, CDMreport, Published by Camp, Dresser & McKee Inc., Cambridge, Massachusetts, 1993.

In summary, partnering at this site is providing cost and schedule savings, quality improvements, and enhanced efficiency, while fostering strong alliances between the three team members. As stated by Boyd Braniff, Alcoa's manager of remediation projects, "We're all part of a larger entity working toward common goals, this is really the driving force that unites our team."

5.4 Future Naval Facilities Engineering Command Remedial Action Contracts

Naval Facilities Engineering Command headquarters has developed a generic RAC package for use by the various NAVFAC EFDs. The generic package generally follows the contract developed by Engineering Field Activity (EFA) Northwest. This will result in all Navy regions having similar RACs. These RACs are cost-plus-award-fee contracts, capable of remediating all contaminants except ordnance and nuclear waste. The contracts will have a base year with four one-year option periods. These contracts will be awarded by competitive source selection. The various regional offices and basic contract data are listed in Table 5.2.

Table 5.2 Estimated Ceilings of Future Remedial Action Contracts by Region[75]

NAVY REGION	$ (MILLION)	STATUS
Atlantic Division[1]	75 (POLs) 250 (all else)	Solicitation phase; award Nov./Dec. 1993
Pacific Division	200	Anticipate award this fiscal year
Southern Division	600	Anticipate award mid fiscal year 1994
Southwest Division	250 (short term) 400 (long-term)	Completed Source Selection Plan & Acquisition Plan
Western Division	200	Proposals due late June; anticipate award 1st Qtr. FY 94
Engineering Field Activity Northwest	80	In the Source Selection Process

[1] These RACs will remediate sites at Northern and Chesapeake Divisions.

[75] Amy Jones, Contracts Division, Naval Facilities Engineering Command Headquarters, Alexandria Virginia. Summarized from interviews of June 1993.

5.4.1 Engineering Field Activity Northwest[76]

Engineering Field Activity (EFA) Northwest is the furthest along in the process. They are currently in the award process of the contract. The RAC is a cost-plus-award-fee construction contract, with one base year and four one-year option periods, and has an estimated ceiling of $80 million. Staff at EFA Northwest stated that adequate competition was received on the solicitation. The RAC will be capable of dealing with all contaminant types excluding ordnance.

EFA Northwest is also a "front-runner" with their fixed-price, indefinite-quantity underground storage tank (UST) removal contracts. The office has awarded two of these contracts at $3 million/year each, and both have been awarded to 8(A) contractors. The "larger" UST removals will be completed under the future RAC. In addition, the office will use a combination of services from its environmental engineers, CLEAN contractors, or the 25 plus fixed-price contracts (in place) for preparing the remedial designs.

5.5 Chapter Summary

The previous assessments have shown that the Navy has selected one of the "more" appropriate methods available for environmental restoration contracting. The future success of the program will not be determined solely by the selection of an appropriate and innovative contracting method, but by the individuals tasked to provide technical, contractual, and daily site monitoring. The skills, training, and motivation of

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[76] Pat Harbin, Head Environmental Contracting Branch, Engineering Field Activity Northwest, Naval Facilities Engineering Command, Silverdale, Washington. Summarized form an interview on June 09, 1993. EFA Northwest is the furthest along in the process, the status of all other EFDs is provided in Table 5.2.

personnel will have a direct bearing on the success of the program. Adequate staffing and training will be key to the success of these contracts. This will be particularly important with the use of the cost-plus-award-fee structure.

NAVFAC headquarters has done well by listening to the administrators in the field, and changing the framework of future RACs. The Navy must constantly monitor the progress of pilot and future RACs. The Navy may consider the future use of a remedial contract framework similar to the Army's Total Environmental Restoration Contracts. Time may show that contracting with a single entity is the most efficient contracting method for (complex) environmental restoration.

Another consideration may be the combination of "cost type" sections for items with uncertainties, and unit prices for items that can be quantified. This may streamline the administration and monitoring of RACs and increase control over contractor productivity.

Finally, all pilot and pending RACs should be modified to include the concept of partnering. Partnering has been proven successful on Navy facility construction, U.S. Army projects, and private sector environmental restoration contracting. Partnering and the "team approach" can only enhance efficiency when dealing with an issue as complex as environmental restoration contracting.

6

Conclusions

6.1 Summary

The Department of Defense is faced with an incredible challenge of cleaning 17,660 potentially contaminated sites at 1,877 installations throughout the United States and its territories. Some DoD experts estimate a cost of $24.5 billion over the next 20 years, with estimated costs as high as $120 billion including Department of Energy sites. To date, the Navy accounts for approximately 2,500 sites at nearly 300 installations, with an estimated total cleanup cost in excess of $3 billion.

Faced with such a large number of sites, expense, and uncertainty inherent with environmental cleanup, all DoD components must continue to explore innovative and alternative contracting methods for environmental restoration contracting.

This thesis has focused primarily on Navy programs, however, the concepts and assessments regarding environmental restoration contracting throughout the thesis can be applied to all DoD components. All components are faced with similar challenges. The differences lie within the various contract administration and oversight organizations within each DoD component.

The Navy demonstrated ingenuity by using alternative (cost plus) contracting methods for remedial action contracts. Future RACs have evolved to cost-plus-award-fee from the original cost-plus-fixed-fee structure; are specific by geographic region vice

having the contractor clean sites at any Navy or Marine Corps installation within the U.S. or its territories; and in general, future RACs will be capable of cleaning all contaminant types excluding ordnance and nuclear waste. Additionally, in several instances, the Navy is delegating contracting authority to the local activities.

Even though the evolution of Navy RACs is encouraging, the Navy must closely monitor the effectiveness of these contracts and their Installation Restoration Program. These areas include:

1. Is there adequate staffing and training of Navy personnel to monitor and administer these contracts?
2. Is the award-fee structure an adequate manner in which to provide the contractor incentive and to control his productivity?
3. Does the program allow the implementation of innovative remedial technologies?
4. How many sites are progressing to the RD/RA phase?

If sites are moving slowly to the RA phase, it may be prudent to consider: (a) implementing partnering between the Navy, its Clean contractors, and its RAC contractors; and (b) adopting a design-build approach as the U.S. Army's Total Environmental Restoration Contracts on any future RACs that may be drafted. As proven in environmental contracting in the private sector, partnering and the "team approach" can only enhance any efficiency achieved. In addition, the Navy has already shown the advantages of adopting design-build on "traditional" construction contracts.

5. As the program matures with cost data and experience, the Navy may be capable of contracting portions of work that are considered a commodity with negotiated unit prices, and contracting work that is considered a service with a "cost type" arrangement. This will decrease the Navy's financial risk in areas with less uncertainty, and provide greater incentive on contractor productivity, while reducing the administrative burden associated with a purely "cost type" contract.

6. The Navy should also monitor the issue of indemnification. What degree of contractor indemnification is fair? Should the entity better able to manage the financial risk, carry that risk? The Navy is receiving "adequate" responses on their solicitations. Are these as a result of the need for work or other market drivers? If so, the Navy (and DoD) may build a false sense of security, by regarding their current policy on indemnification as "adequate."

The future success of the Navy's program may lie on the Navy's ability and willingness to continually and objectively appraise its progress and effectiveness, and to make necessary changes and improvements.

6.2 Areas for Further Research

This thesis has been limited to reviewing the contracting methods of Navy remedial action contracts, which raises several other areas of interest. Suggestions for areas of future research in the DoD environmental arena include:

1. An analysis to determine if the Navy's cost accounting and invoicing procedures need improvement.

2. A comparison of the environmental contracting methods and effectiveness of each DoD component. Is one DoD component "doing it better than the rest?" If all DoD components adopt one method of contracting, what would be the barriers for the acceptance of such a program?

3. The author was given the privilege of attending a DoD interagency environmental conference. It was observed that there are several federal agencies contracting for environmental cleanup, including: the Army, Navy, Air Force, Federal Aviation Administration, Defense Logistics Agency, Government Services Administration, and the Environmental Protection Agency. Is it effective to have all of these agencies contract for environmental cleanup? Should just a few of the above administer work at all the sites? How can these agencies better combine their efforts by sharing lessons learned?

4. An analysis of how partnering could be implemented in DoD environmental restoration contracting.

5. An analysis of which, if any, Federal Acquisition Regulation clauses should be added for environmental restoration contracting.

6. An analysis of the success and progress of the Army's Total Environmental Restoration Contracts.

7. An Analysis whether the flexibility available to the government through design-build contracting should be expressly added to DoD's contracting authority through statute.

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